Pit and Quarry

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A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

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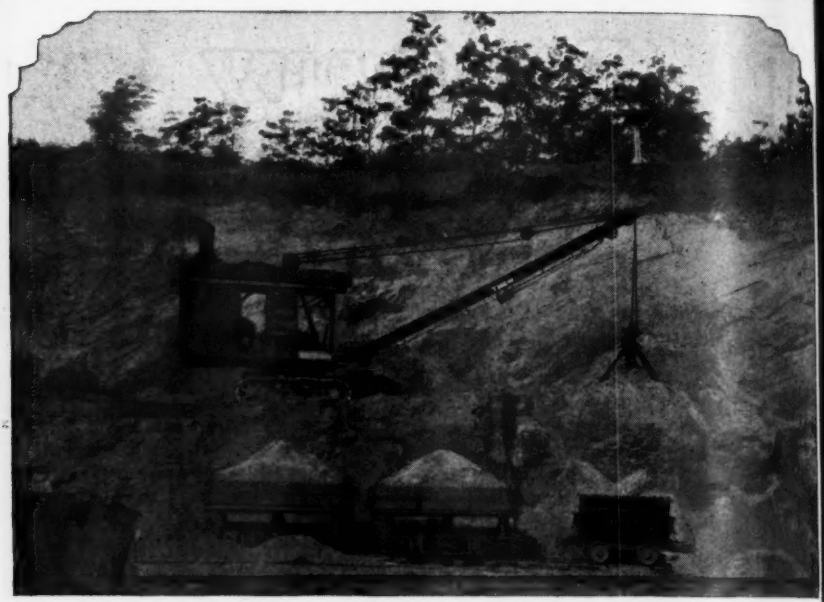

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If you are interested in increasing your output and cutting your cost find out more about the Thew.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Thew
Power Shovels

Pit and Quarry

Vol. 6 Chicago, Ill., September, 1922 No. 12

Let George Do It

"LET George do it," is a trite old saying, and many of us laugh at the remark, thinking it is meant entirely to shift responsibility, or to denote that we are rather inclined to take our ease while some one else, the erstwhile energetic George, is performing the task.

Yet this old saying does and can mean much more. George is simply the other fellow, and he may be an expert in his line. A man who has specialized on certain things, so that he can do them better, much better than others. Thus it may be wise to let George do some things for us.

Self reliance is a strong American trait. It is one to be commended, and this characteristic has pushed us forward as a nation with giant like strides, yet the same trait can hold the individual back, for no one can be expert in everything and there is a limit as to the ability of all of us and likewise as to the number of things one can accomplish in a given time.

Thus it can be seen that any one who attempts to run a business of any size by himself is making a mistake. Naturally he has the help of his employees and although these may be efficient and faithful, yet they are not necessarily experts, otherwise he would not be able to employ them.

He can, though, employ experts, but need not have them always on his pay roll. The great beauty of their work is that if they are real experts, the work they do will more than pay for itself.

This is the subject that confronts nearly every business man today. Shall he employ experts to help in his business and is it proper to replace only machines with more modern ones and introduce new methods in his operations?

This is not a question that can be dismissed lightly for it is brought to mind each day by the business man himself as he is pushing forward his business. His employees make suggestions, while salesmen and others bring the problem to him again and again.

The business man would soon bring himself to grief by adopting every suggestion that is made to him. He would be bankrupt if he was continually scrapping machines and putting new ones in their place, and if he turned his operations over to others, they would soon control it instead of him doing so.

It is a difficult problem to know what to do under all circumstances and the best criterion is to find out what others have done.

First let us consider the employing of experts. A sand or a gravel operator has a set of storage bins to build. He has gravel or stone, likewise sand and it only seems a small matter to him to build himself a set of concrete bins. He little thinks that the bins might have been built cheaper and so designed as to save hundreds and even thousands of dollars in a year in the operation. The designing

and building of bins has almost become a special line in itself and today there are experts who advertise exclusively for this kind of work. So it is with many other lines in the pit and quarry business.

There are experts on washing machines, screws, crushers, conveying machinery, explosives and many other lines. These men can and do save their employers many thousands of dollars over the fees paid them, and the good they do continues ever after their employment ceases. One man put the results obtained in an apt phrase, when he wrote, that "the work he (the expert) is doing is a never ending source of satisfaction."

It is the same thing with many machines. A business man recently told the writer that for four years he had hesitated about purchasing a certain machine, yet within a year after installing it he estimated it had given them new business and saved them about five thousand dollars more than the price of the machine.

This is true in many cases. An "ad" that recently appeared in this journal told how a machine had put $10,000 in an operators bank account in four months' time.

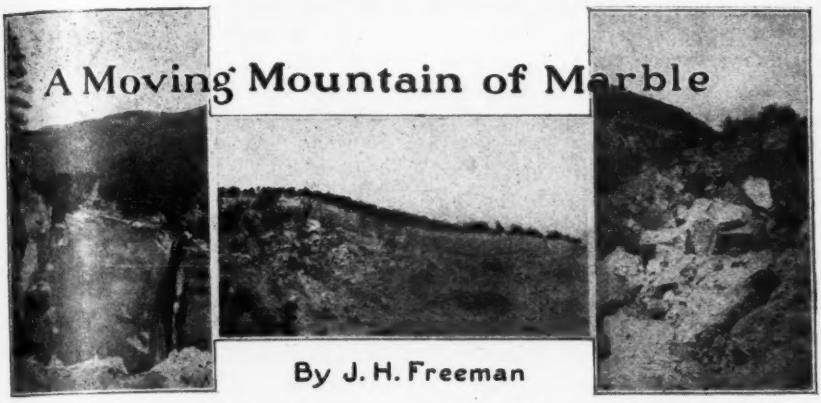
There are many cases of this kind. A business man may want to install modern machinery yet he may not be in a financial position to do so. There are times that a man must pay the price of being hard up. As a rule though there is a way and when a machine makes a decided saving it is possible in some cases to make the machine finance itself.

It is the same thing in the improved methods, for frequently they will pay large dividends. Some years ago when wagons were used to deliver stone in our cities, a quarry man complained that he could sell all the stone he could produce if he had more horses to deliver. He could repair some old wagons he had and could buy some horses on terms, but he did not have money to build more stables. He hired a man to help him. This man found that his horse stalls were built five feet wide. A nearby livery stable had only four foot stalls. The stable man and a helper was put to work to rebuild the stalls. Thus where twenty horses were housed twenty five were put in. The rest of the stalls were built out of discarded lumber and old crates that machinery had come in that had been around the place for years. A harness room was made into stalls and three more horses were accommodated. The harness was hung behind each horse so that time was saved in getting it. Thus four teams were housed and additional stone delivered. The next step was to arrange with the customer to do his own hauling, by reducing his price. Thus five more teams were put to work without adding to the pay roll.

By this nineteen teams were used instead of ten, so that this man's income was nearly doubled. His crushers were kept going continuously and he soon had such a prosperous business that other improvements were made so that additional profits were made. Within a few years a business that was stagnating became a very profitable one, all due to a slight change in a stable.

There is but one guide in these things. Find out what others have done and are doing, consider these matters and be willing to take a chance. Have self confidence and reliance in your own judgment and with these the proper decisions are likely to be made, for what others have done to bring success, you can do. If George can do it you can, or you can hire George to do it for you.

The Dominion Sand and Gravel Company, Cleveland, Ohio, has been incorporated with a capital of $500. Incorporators: J. M. McSweeney, Edith I. Pierson.



A Moving Mountain of Marble

By J. H. Freeman

ONE of the strangest freaks of nature is a moving mountain of marble at Calcite, Colorado. Calcite is a lime-quarry town about 15 miles southeast of Salida. At this place there are a number of extensive limestone quarries. In all but one of these, the stone is quarried by blasting down the blue limestone ledges, which here cross the canon, and stand almost vertical, nearly a thousand feet high on each side.

In this one exception, the stone quarries itself without the assistance of dynamite or pick.

But to explain these main ledges run north and south, and stand on edge, but a large slab about a half mile long, and half as wide and more than 100 feet thick, has at one time split off and dropped over to the east, forming a small range of mountains. This slab has in some way been metamorphosed into a fine grained crystaline marble of many beautiful shades. Some of the crevices are filled with banded onyx.

Years ago efforts were made to develop this into a quarry for the production of cut marble, but it proved to be too much shattered to produce blocks of salable size.

Later it was discovered that the marble could be burned into an excelent quality of lime. The Colorado Fuel and Iron company then began to quarry it near the base on the west side of the small mountains, by driving in on a level floor along the whole mountain side, and knocking down the face of the cliff. On the floor the masses are broken up into suitable sizes for handling and loaded into 2-ton tram cars. These are allowed to drift down from the many branch tracks onto the main tram lines, and down these to the end of the dump, where they automatically tip their loads into steep metal chutes which convey the material directly into the cars standing on the railroad tracks 60 or 80 feet below. The empty tram cars are hauled back to the breast of the quarry by mules.

It is this mountain that is continually moving out onto this quarry floor, without any apparent reason. In fact the rock is simply quarrying itself and coming down to the floor ready to be loaded and shipped.

Our snapshot was taken from the opposite mountain nearly a thousand feet away. It shows a small part of the floor with its many tracks and a score of tram cars. Note the comparative size of the woman sitting on the stone at the near side of the floor.

At the upper left corner of the picture can be seen some of the blocks of rock as large as a city block, which have already separated themselves from the mountain and are moving, of

their own volition, down toward the floor.

Many cedar and pinon (nut pine) trees can be seen standing upright on them. Near the center are some which have tipped over. Farther to the right are high smooth cliffs which have moved several feet from their original position in blocks more than 100 feet long. They are over 100 feet high and contain trainloads of good material. The soil on top is only a few inches deep.

Another picture was taken from the brink above, looking down through the crevices between the blocks, toward the floor. The hugh block in the center has already moved about 20 feet. It is 20 feet square and of untold depth. It has pinon trees growing on it, each one about 20 inches thick.

The third picture is a view from the summit near the center, looking down into the quarry. It shows nearly an acre of rocks which are broken loose and moving, with the trees still standing upright. In the foreground are some which have tipped over.

It is not alone the mountain above that is moving, but the floor too gets in action sometimes. One night when the train cars were lett near the breast as shown in the picture, there was an upheaval of the floor and in the morning the cars were almost standing on end. The floor bulged up 8 feet.

Baby earthquakes are felt in the vicinity when some of the rocks are breaking loose. One day a Mexican crawled among the rocks after a rabbit but made a hasty retreat when the mass made a general grinding move.

This is the most wonderful case on record of automatic rock quarrying. The mass of rock comes down regularly, breaking smaller as it nears the floor, keeps up a constant supply, but does not overrun the quarry.

Some superstitious persons are inclined to accuse the superintendent of invoking the aid of some supernatural power to assist in tearing down the mountain.

In his own defense the superintendent writes me as follows: "There is no mystery about the movement of this mass of rock; it is merely a matter of gravity. The main ledge of limestone, lying at quite an angle, is riding on a layer of very dense slick red clay. As the toe is removed, the rock slides."

Big Building Month

July was the fourth consecutive month of unprecedented building activity, according to the F. W. Dodge Company. Contracts awarded during the month in the 27 Northeastern States amounted to $350,081,000. This was a 2 per cent increase over June and a 65 per cent increase over July, 1921. It is greater than any previous monthly total except the record figures of April and May of this year. The July increase was in central western territory, eastern districts having shown slight declines.

The July figures brought the total for the first seven months of this year up to $2,041,065,000, an unprecedented figure, 60 per cent greater than that for the corresponding period of 1921.

July showed a levelling tendency not only as between localities, but as between classes of construction. There was a decline in the volume of residential construction from June, which was more than equalized by increases in industrial and public works construction. The figure for industrial plants, $31,882,000, which was 9 per cent of the month's total, was the largest for this class since November, 1920. Residential construction, however, still maintains the lead, having amounted to $108,951,000 in July, 31 per cent of the month's total. Public works and utilities amounted to $79,162,000, or 23 per cent of the total; business buildings, $44,020,000, or 13 per cent of the total; educational buildings, $40,690,000, or 12 per cent of the total.

Contemplated new work reported during the month amounted to $508,222,000, compared with $350,081,000 for contracts awarded.

The Utilization of Waste Heat from Rotary Cement Kilns

By JOSEPH BROBSTON, Nazareth, Pa., Vice president, Dexter Portland Cement Co.

THE sporadic efforts made to use the waste heat of rotary kilns prior to the sudden and material increase in the price of coal caused by the war, did not amount to more because of the very low price that the industry as a whole paid for its kiln coal. The coal generally used is the slack or screenings from ¾ gas coal. This was formerly considered a waste product by the coal mines and had to be moved when the ¾ coal was shipped, which resulted in a price to the cement industry ranging from 20 to 75 cents a ton at the mines. The cost per barrel for burning cement was therefore comparatively low and the efforts of the manufacturers were mainly directed to installing labor saving machinery and reducing the cost of pulverizing the raw material and clinker.

The First Modern Waste-Heat Boiler Installed in the Cement Industry

When the price of coal jumped to $5 per ton at the mines, however, conditions were entirely different, and in 1915 the first modern waste-heat boiler plant in the cement industry was installed at the Catskill plant of the Alpha Portland Cement Company. This installation was a success from the start. The plant operates five kilns, three being 9 ft. in diameter by 120 ft. long and the other two 7 ft. 6 in. in diameter and 120 ft. in length, resulting in an output of about 3,000 bbl. of cement per day. The gases from these kilns are drawn into a main or equalizing flue directly in the rear of the kiln housing or dust chamber, dampers being installed to by-pass gases into the kiln stacks, if necessary. Connections leading from the back of this flue conduct the gases to two 750-hp. Edge Moor boilers, of the four-pass type. Two Green fuel economizers, horizontal type, are installed after the boilers. The forced draft is provided by a fan located directly back of the economizers, driven by a Terry turbine. A steam pressure of 175 to 180 lb. is maintained, and sufficient power is generated to operate the entire plant. The finely pulverized stone carried over from the kiln by the hot gases is blown from the boiler tubes three to four times in each 24 hours, a hand lance using 140 lb. of air being employed for this purpose. The economizer tubes are blown off through plugged openings in the top of the casing several times each week. The clean-out doors at the bottom of each pass are opened once a week and the dust removed. Clean-out doors are also provided in the flues. In this way, if the draft at the stack chamber is not allowed to drop below 0.25 in. (water pressure), no real difficulty is experienced in keeping the installation free from dust. The temperature of the gases is reduced from approximately 1400 deg. fahr. at the mouth of the kiln to about 450 deg. when they leave the economizer. The Cochran feedwater heater is heated by the exhaust steam from the pumps and fan turbine. The operation of the boilers has not increased the amount of coal used per barrel in the kilns. It is about 95 lb. per bbl. It requires not less than 40 lb. of coal per bbl. to generate the power required to operate a cement mill. Deducting this from the 95 lb. being used in the kiln we find that today this company is burning their cement with 55 lb. of coal, which is much closer to the theoretical amount

required, that is, 30 lb., than the cement manufacturers had ever hoped to come, and means that a rotary kiln with a waste heat boiler attached is as economical in its coal consumption as the old-style upright kiln. Plants almost exactly duplicating the one described were promptly installed at another plant of the Alpha Portland Cement Company and at the Dexter Portland Cement Company, and plants using B. & W. boilers were installed by the Universal and Louisville cement plants.

By this time all the manufacturers of portland cement were aware of the importance of this development, and the Conservation Committee of the Portland Cement Association, started as extensive investigation of the entire question. The first report presented in December, 1918, showed eight plants in operation. Today there are 24 plants in operation generating with their flue gases from 51 to 140 per cent of the power they require. There are about 120 operating portland-cement plants in the United States, so that 20 per cent of the plants are now making use of their stack gases, saving on the average 40 lb. of coal for every barrel made. This means that these companies are actually using about 400,000 tons of coal less per year than they did formerly.

It may be noted that in some cases more steam than is required to operate the entire cement plant is generated by the waste-heat installation. In other cases only a little over one-half of the amount required is secured.

While this is to a certain extent a question of the efficiency of the boiler installation, it may be due to other causes. The plant that is burning cement with 80 lb. of coal to the barrel will not have the volume of stack gases or temperature that will be found at the plant using over 100 lb. to the barrel, so that naturally not as much steam can be generated. The total amount of coal used per barrel, however, may be lower at the plant using the 89 lb. as it may be possible to generate the additional power required in auxiliary boilers with less than the extra 25 or 30 lb. of coal consumed in the kiln.

But even when two waste-heat plants generate the same amount of steam, there may be a great difference in the percentage of the machinery that can be run with it. Where the amount of steam secured is just sufficient to operate a mill in which the prime movers are well-designed modern turbines, it would probably be only 75 per cent of the steam required to operate another plant which is still being run with old-style inefficient reciprocating engines.

Power Required to Grind a Barrel of Cement

Where the prime movers are identical, there might be a wide difference in the percentage shown. Recent investigations made by the Conservation Committee of the Portland Cement Association show that the power required to produce a barrel of cement at plants using different types of grinding machinery varies from about 13 kw-hr. per bbl. to about 19 kw-hr.

Some progress has also been made in the last three or four years in solving two other problems. The loss through radiation is being materially reduced by putting between the shell and the firebrick lining in the upper part of the kiln, a brick cut from diatomaceous earth. While it has not been possible to determine the exact amount saved in this way, it has been shown conclusively that where waste-heat boilers are being used this insulation raises the temperature of the flue gases 150 deg., and where boilers are not installed the insulated

kilns require from 5 to 10 lb. per bbl. less coal to burn clinker than those not insulated.

This problem is not as yet fully solved, however, as it has been found impossible to use the insulating brick in the hottest section of the kiln, known as the burning zone. Here the fluxing action of the clinker at the high temperature necessarily maintained was such that the firebrick were practically destroyed in from 16 hr. to four days. The hot zone can undoubtedly be insulated by using carborundum, but at the present time the cost of doing this would be prohibitive.

The Technical Problems and Conservation Committees of the Portland Cement Association are working on this problem with the firebrick manufacturers and it is hoped that a suitable block that will stand up and which can be made at a reasonable price, will be developed.

Possibility of Reclaiming Heat Carried Off by Clinker

As to the possibility of reclaiming the heat carried off by the clinker, the development of the rotary pressure cooler in the last few years has demonstrated that where the cooler is of sufficient size and proper design to handle the kiln output it is possible to heat the air entering the kiln to a temperature of 800 to 900 deg. fahr. and to have enough heat left over to dry the coal used for kiln operation. How much this saves is problematical. So far the power required to operate the system has been found to be so great that there appears to be very little actual saving.

In the ideal cement plant of the future there should be no wasted heat. Where the engine room is equipped with the modern economical type of prime mover, and the mill has been designed and equipped with grinding machinery that requires the minimum amount of power, the stack gases will generate not only sufficient steam to run the plant and heat the buildings, but there will be enough left over to dry the stone. All the heat will be drawn from the clinker and it will be sufficient to raise the temperature of the air required to support combustion in the kilns to a point that will materially reduce the amount of coal needed for burning, and there will be enough left over to dry the coal before it is pulverized.

With the preheating of the air and the insulating of the balance of the kiln, the amount of coal required to burn should certainly not be over 75 lb. to the barrel. Deducting from this the 40 lb. required for power, the 3 lb. required for drying the stone and 1 lb. each for drying the coal and heating the buildings, the theoretical figure of coal required to burn a barrel of cement is reached, namely, 30 lb. per bbl.

While this ideal may never actually be attained, the work on all three problems has progressed far enough to show that within the next five years through the insulation of kilns, the preheating of the air going to the kilns, and the use of stack gases, there will be saved in producing 100,000,000 bbl. of portland cement, besides the 400,000 tons already mentioned, about 1,600,000 tons, or a total of 2,000,000 tons due to the utilization of waste heat in the industry.

The Boustead Electric & Manufacturing Company, Inc., of Minneapolis, Minn. has just been appointed Northwestern distributors for the Ideal Electric & Manufacturing Company of Mansfield, Ohio, manufacturers of squirrel cage, direct current and synchronous motors, AC and DC generators up to 1000 K. W., motor generator sets, electro-plating outfits, etc. The Boustead Electric & Manufacturing Company has for years specialized in rebuilt motors and generators and at the present time maintains one of the largest and best equipped electrical repair shops in the Northwest.

Produce Talc and Soapstone for Many Important Uses

AT Henry, Va, the Blue Ridge Talc Co., Inc., is producing talc and soapstone in a number of varieties. Among the different products are red, yellow and gray facing talcs, magnesium silicate, 350 mesh, low lime for paints and polish, soapstone dust for plastic cements, asphalt filler and composition flooring. Quite a large proportion of the talcs find uses in veterinary remedies, insect powders, lubricants, linoleums, roofing, rubber and sealing wax. There is also a line of mineral blacks running high in carbon.

The officers of the corporation are C. D. Bryant, President, E. D. Gregory, V. P., and C. D. Kitson, Sec. & Treas.

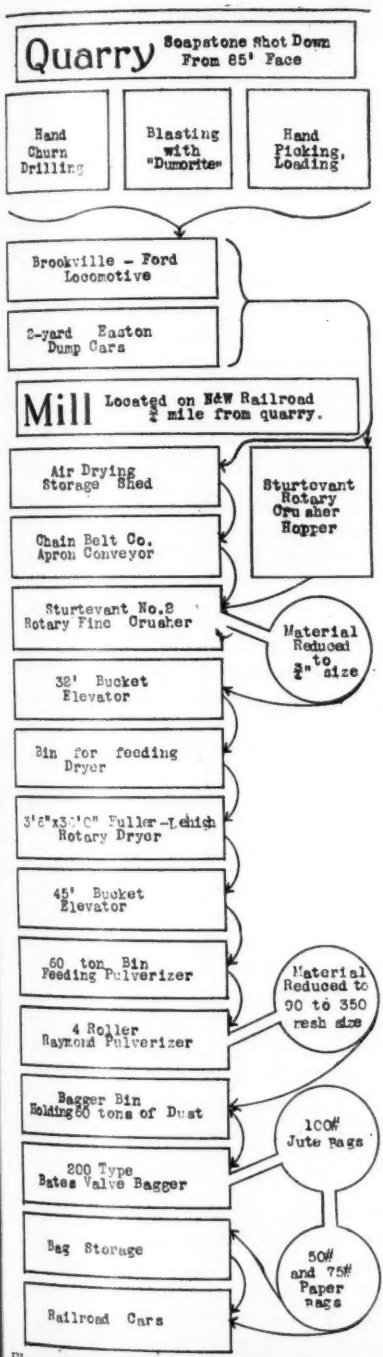
About a year ago the company began the building of a new plant, replacing the one in use up to that time. This rebuilding has recently been finished, and operations are going ahead in the new structures and with the new equipment lately added.

The quarry operation does not differ radically from the quarrying of limestone. The soapstone, shot down from an 85 foot face, is reduced to fairly small sizes during the blasting operation, in which Du Pont "Dumorite" dynamite is used. After the material is thrown down it is carefully sorted into four grades, the first step in the processes of producing a variety of material for a wide range of uses. Considerable pains are taken to insure a careful selection of the four grades. This work is done by hand, as is also that of loading into two cubic yard Easton side dump rocker type cars. These cars are coupled in trains and hauled by a Brookville-Ford locomotive to the pulverizing plant, located on the N. & W. Railroad, three-quarters of a mile from the plant. All crude soapstone is moved between quarry and mill in this way.

At the mill the soapstone is either dumped direct into the crusher hopper of a Sturtevant No. 2 rotary fine crusher, or is put into an air drying shed, from which, after it is dried, it is reclaimed by a Chain Belt Company apron conveyor, which delivers into the crusher hopper mentioned above. The Sturtevant fine crusher reduces the material to ¾-inch size, and deposits it on a 32-foot bucket elevator. This elevator runs to a bin above the rotary dryer, a 3½x36-foot Fuller-Lehigh. In this piece of equipment all excess moisture is removed from the material and in proper condition for the succeeding milling operations, which result in the various products that the company manufactures.

The product of the rotary dryer is taken by a 45-foot bucket elevator to a service bin of 60 tons capacity. From this bin is fed a four roller Raymond pulverizer. This machine pulverizes to degrees of fineness ranging from 90 to 350 mesh. Working in conjunction with the pulverizer is a Raymond cyclone system, which takes the output of the pulverizer, separates it into various grades, elevates and deposits it into bins feeding a 2-tube 200 type Bates packer. This automatic bagging and weighing machine packs the various grades in 100 pound Jute bags and 75 and 50 pound paper bags. This packed finished stock is either sent direct to cars from the point of packing, or to storage, from which cars are later filled.

A product of the company differing rather from the regular line is "AFRIK," a mineral black with a


Quarry
Soapstone Shot Down From 85' Face
Hand Churn Drilling
Blasting with "Dumorite"
Hand Picking, Loading
Brookville - Ford Locomotive
2-yard Easton Dump Cars
Mill
Located on N&W Railroad ½ mile from quarry.
Air Drying Storage Shed
Sturtevant Rotary Crusher Hopper
Chain Belt Co. Apron Conveyor
Sturtevant No.8 Rotary Fine Crusher
Material Reduced to ¼" size
32' Bucket Elevator
Bin for feeding Dryer
3'6"x30'0" Fuller-Lehich Rotary Dryer
45' Bucket Elevator
60 ton Bin Feeding Pulverizer
Material Reduced to 90 to 350 mesh size
4 Roller Raymond Pulverizer
Bagger Bin Holding 60 tons of Dust
100# Jute Bags
200 Type Bates Valve Bagger
Bag Storage
50# and 75# Paper Bags
Railroad Cars

Flow Sheet Showing Operations at Blue Ridge Talc Co. Plant

carbon content of about 80 per cent. This material is shipped to the mill by the N. & W. Railroad in open type cars from the company's deposit in an adjoining county. From the railroad cars the mineral black in its crude state is loaded direct into the two-yard Easton dump cars and switched by the Brookville-Ford locomotive to a small elevator, which delivers it direct into the rotary dryer. From this point on the process is much the same as that to which the soapstone is subjected. There is a good market for material of this kind, and the particular brand that the company manufactures is quite popular with certain trade.

New Morris Office at Cleveland

The Morris Machine Works, Baldwinsville, New York, have just opened up in Cleveland, Ohio, a new sales office to take care of the Ohio territory. Mr. J. E. Walsh, who is also in charge of the Detroit office of the Morris Company, will manage the Cleveland office assisted by Mr. L. M. Francis and Mr. R. F. Weeks. It is expected that Mr. Walsh, whose success at the Detroit office has caused the company to confer this added responsibility upon him, will make the state of Ohio a big producer of orders for Morris machinery.

The Ohio Marble Company, of Piqua, Ohio, has recently purchased two Porter 16-ton saddle tank locomotives. Also the Wagner Quarries Company, of Sandusky, Ohio, has just ordered one 21-ton, 4-wheel connected, saddle-tank Porter locomotive for their plant at Castaliak, Ohio.

A study of the marketing of slate is being made by Dr. Oliver Bowles of the U. S. Bureau of Mines. In company with the executive secretary of the National Federation of Construction Industries, Dr. Bowles recently visited the slate producers and dealers in Richmond, Va.

Artificial Drafts for Boilers

THERE are many cases, in operating boilers, for pits and quarries, when it is not possible to get efficiency with natural draft, which not only means that there is a lack of steam, but extra money is wasted in the coal pile.

To overcome these difficulties there are now on the market a number of different kinds and systems of artificial drafts, meant for boilers.

The two simplest draft systems are known as *forced* draft and *induced* draft. The customary installation on forced draft is by means of a fan or fans to drive air into the ash pit and up through the fire bed to increase the draft and thus give better combustion.

The fan can be operated by either a steam engine or electric motors. The fans can be placed in the side walls of the boilers and the air thus blown into the ash pit, but the ashes can interfere with the operation of this system and the heat and large clinkers from dumping grates, can injure the fans. Then too the velocity of the air is likely to be too great.

For these reasons a forced draft system is generally designed to be operated by a single fan with air ducts run from it to the ash pans under each boiler. Thus one fan can serve a large battery of boilers.

Usually the fan is set on the floor with the motor or engine directly connected with it, and the air is driven through ducts under the floor to the ash pits. The ducts may enter the ash pit from either the sides or from below or through the bridge wall. Dampers should be provided so that the air can be regulated or cut off entirely when desired. The ash pit must be arranged to be tight so that the air will be forced up and through the grates. The velocity of the air should seldom exceed a thousand feet per minute.

There are times when there is not sufficient floor space for the fan, so that the draft fan is located above the boiler and the air carried by steel ducts under the floor and into the ash pits .

With induced draft, instead of placing the fan to drive air into the ash pit, the fan is placed at the base of the stack in the breeching. A by-pass with a damper in it is used to carry the smoke and gases around the fan in case of accident. When the fan is working the smoke and hot gases are sucked up by the fan, passing through or by it. Thus provision must be made to keep the bearings of the fan water cooled.

It is also possible to use induced draft in connection with forced draft; in fact at times it is almost essential to have the induced with the forced draft.

Besides the regular fans for forced draft regulated by the firemen, there are on the market a number of draft systems that are automatically controlled or so controlled as to balance the draft, forcing it as new fuel is fed into the furnaces and cutting it off as the green coal is heated to a high temperature.

Naturally the basis of all coal consumption is the grate that the coal is burnt upon. It is possible to increase the efficiency of any boiler with various appurtenances on any kind of a grate; but to obtain the greatest possible efficiency the first thing necessary is to have the proper type of grate, a real combustion machine producing CO_2 combustion instead of CO. With such a grate, then, with either forced or induced draft or both, the boilers can be made not only 100 per cent efficient, based upon the manufacturer's rating, but even be given a 200 to 400 per cent increased rating.

With such results the installation of additional boilers in a growing plant can be saved, for two boilers may be

made to do the work of three. With induced draft, a new and larger stack to care for increased load requirements may likewise be saved.

There can also be an increase in the flexibility of the plant, providing for quickly increasing the load or for varying load requirements, due to an adjustable draft.

If fuel economizers are used induced draft is a necessary adjunct and these always mean a saving in stack installation.

Due to more complete combustion there is always a saving in the amount of coal used; but in addition to this, by means of these artificial drafts, cheaper grades of coal can be burnt, thus making the saving in fuel a very decided one.

All of this means more pounds of water evaporated by a pound of coal. It is to obtain these results that a boiler is operated.

Teaching Men to Use Tools

IF AN employer would purchase some new patented tool he would either expect to teach some man how to use the tool or have some man expert in its use to show his men how to use it. This is both a natural and logical thing to do.

Yet it is a strange fact that although employers may go to some cost and pains to teach men how to handle new tools, yet they will allow men to go on using tools that are in common use, day after day, in the wrong manner.

This may seem like a small matter; yet the amount of work done by a man with a tool improperly handled is considerably less than in the hands of the same man when he has learned how to use it.

This is frequently the case with many tools that are used in quarry operations, such as picks and shovels, striking hammers, hard drills, bars and sledges. Some operators may dispute these statements; yet if any one will reflect for a minute he will call to mind a number of cases when men have been employed as sledgers to break rock, yet when the new laborer was seen at work, the operator has exclaimed to his superintendent, "Put that man at some other work, he knows nothing about sledging, and wouldn't make a sledger in a hundred years."

If it is the case with sledging it is likewise true of other tools. Although in some cases men cannot be taught to use dextrously certain tools, yet it is not true that most men cannot be taught to handle tools properly.

It may take some time and patience but it can be done, and it is worth the effort to do it. Not only can foremen teach but in many cases other workmen can be used at this task.

There are correct and incorrect motions for handling all tools. The incorrect ones generally are superflous and only mean to tire the man. Teach them the correct motions and much waste time and energy will be saved. This is shown by an experienced sledger breaking a boulder with a few blows of a sledge when one not knowing how to use the sledge and his body would not break such a boulder with ten blows. It is the same way with men handling a bar.

In order to teach men, the proper motions must first be known by those who are to do the instructing. These they must learn from watching experienced men who do their work with ease, or by experimenting. Another method is by learning them from others.

The Roacoe Rock and Sand Company, Los Angeles, California, has been incorporated with a capital of $50,000. The directors are: C. L. Heyler, O. E. Wein, J. B. Bradford, all of Los Angeles.

English Opinions of American Machinery

BY ALFRED B. SEARLE,
Consultant to the Pit and Quarry Industries, London, Eng.

IN my position as technical advisor to many firms engaged in the lime, clay and sand-working industries in the British Isles I have exceptional opportunities for knowing the various opinions of owners and engineers in such firms with regard to American plant and machinery.

In their ingenuity of application, in their boldness in applying machinery and in their rapid rate of working, the American firms who have entered the English market are greatly to be admired. Their salesmanship in usually excellent, their willingness to state technical facts and to help the prospective buyer are also to be commended, though the "cocksureness" of some representatives who have no knowledge of English conditions is a little disconcerting.

The first difficulty that the English engineer or prospect meets when dealing with an American salesman is the return to be realized in the outlay. America is so large a country and contracts are made there on so large a scale that a machine like a steam shovel may be worn out on a single job. In England, on the contrary, a 10,000-ton proposition is a very large one and when it is finished there will be no further use for the shovel. Yet it would not pay—in comparison with the moderately cheap British labor—to install a shovel for a job of this size and scrap it when the job was done. Still less does it pay to use a shovel on the very numerous jobs where only about 200 tons of material are handled each week. Consequently, many of the arguments used by American salesmen as to the saving to be effected leave the English prospect quite cold.

Another objection felt by many English engineers is the poor showing made by American machines in comparison with the British ones of similar design. In the case of steam shovels, for example, there is nothing offered by American firms which can compare, from an engineer's standpoint, with the best British shovels. This does not mean that the American shovels are inferior for American conditions, but that when they are compared, as machines, with the English shovels the latter have the advantage every time.

In this connection it may be well to state that the frankly untrue statements of some representatives of American machinery manufacturers create a very bad impression and do their firms a vast amount of harm. The average English engineer meeting a representative whom he does not believe enters into no argument, but merely registers in his mind a determination that he will not buy from a firm whose traveller's statements are untrustworthy. This is a lesson that many American firms now endeavoring to sell plant in the British Isles have yet to learn.

Another lesson, of equal importance, is the respect with which technical advisors are treated by their clients. Such men are paid a fee to make unbiased and impartial recommendations; they do not accept commissions or bribes from the machinery manufacturers and if any English engineer is found who does this he may be written down at once as of minor im-

portance. There is a large number of commission agents who will sell any kind of machinery but their services are not required by the best prospects, who have their own independent advisory engineers. For a salesman of any nationality to try and bluff such an engineer or to treat him with the discourtesy often shown by some American representatives is sure to end in the failure of the firm employing such a representative.

A British firm which is in the market for pit or quarry plant is usually quite willing to listen to anything any salesman of ability may put before it but the decision will be passed on (1) the quality of the workmanship of the plant offered, as compared with English machinery; (2) the saving to be effected on what Americans would regard as very small outputs; (3) time required for delivery; (4) terms of payments; (5) the behavior of a machine of the same pattern in an English works when the machine can be inspected by the prospect; and (6) the impression created by the salesman from which the reliability of his firm will be judged.

While great pioneers, and willing to take considerable risks in order to improve their business or make a greater profit, the average English quarry and pit owners—and especially their technical advisors—are cautious to an extent which few Americans appreciate. An English firm expects to continue in business for many years; a man who fails has not nearly the same chance of recovery as he would have in the States, and his social and family ties have a much more serious effect on his outlook. Consequently, most Englishmen regard themselves more as *trustees* of their business than do most Americans and for that reason they proceed with an amount of caution which would be regarded as quite foolish in a country where everything is on a much larger scale.

Many English purchasers of American plant have been very disappointed at the roughly finished and "makeshift" machinery, much of which they regard as being too lightly built and lacking in strength and durability, while the amount of power required —owing to roughness of finish—is often out of proportion to the work to be done. This does not apply to all machines imported from the States, but it has been wholly applicable in so many instances in the past that British firms are naturally anxious to avoid placing themselves in such an undesirable position, and are consequently very cautious.

English makers of machinery are very alert—notwithstanding their apparent slowness—and they are, of course, fully acquainted with English conditions. As a result they can usually put up a very good showing against any American machine which is not fully protected by patents. As regards such appliances as steam shovels and other excavators, they are on exceptionally safe ground and the only chance which American firms have is obtained by a greater extravagance in advertising and in adapting their machinery so as to comply strictly with English conditions and requirements.

In short, American firms in the English market are usually strong on advertising and salesmanship but they are often lamentably weak with respect to the technical requirements of the English prospects, the conditions under which the plant is used and in adapting the plant to those conditions. English manufacturers of similar plant, on the contrary, are quite sound on the technical and engineering side, but they are often lacking in selling power and might make many more sales and to much greater advantage if they would advertise more extensively and intensively and would

employ salesmen of a somewhat different type.

The mentality of the English pit and quarry owners is quite different from that of the American ones and the technical and commercial conditions in the two countries are quite different. If American manufacturers could once learn properly to understand the requirements of the English pit and quarry owners and would set out in a proper manner to meet those requirements they would make many times more profit than they do to-day.

The easiest way to secure an Englishman's order is to lend him a machine for use in his plant, with a definite written guarantee to take it out and make good any damage done to the rest of the plant wherever called upon to do so. Few English makers of pit and quarry plant adopt this method—it requires more capital than they care to expend on it—but where it is done in a proper manner, with due regard to the courtesy with which English prospects and their engineers expect to be treated, there is no question as to its being the best method of securing business and of building up a permanent and thoroughly sound British trade.

New Government Paper on Shaft Sinking

Technical paper No. 276 of Bureau of Mines, Department of the Interior, on "Safe Mechanical Equipment for Use in Shaft Sinking," contains an amount of information that should be of material advantage to operators in the pit and quarry field whose operations include this work. The author of the pamphlet, R. H. Kudlich, understands his subject very well and, while he does not in the present case write at great length, still the work is in its own class quite a complete one. Copies may be obtained by writing the Superintendent of Documents, Government Printing Office, Washington, D. C.

Road Building Boom in Canada

Reports of Highways Information Service, New York, from the various Canadian provinces for June, 1922, show contracts for new roads and streets let during that month to the value of $3,774,200. The total number of contracts let was 72. New projects reported under consideration numbered 146 and were to cost $4,697,600. The value of the new construction contracts for during June in each province was as follows: Ontario, $1,664,900; Quebec, $822,000; New Brunswick, $151,900; Nova Scotia, $115,000; British Columbia, $383,300; Alberta, $16,500; Saskatchewan, $26,000; Manitoba, $47,400.

In Ohio, industrial firms and corporations have been holding conferences at various points with chambers of commerce with reference to the cost of liability insurance. The ever-increasing rates have reached a point where many business men think they are unreasonable. The experience of many firms shows that over a period of several years they or their workmen have not received over 10 or 15 per cent of the amount of money paid to the state workmen's compensation fund. The amount to the credit of this fund in the state treasurer's office is now over $40,000,000. Ohio quarrymen feel that the rates charged against them are excessive.

In general, the best mica is to be expected in regions characterized by geologic stability, says the U. S. Bureau of Mines in Serial 2357, just issued. In localities where, subsequent to the formation of the pegmatites, readjustments of the earth's crush have taken place, much defective mica is to be expected. Such readjustments may be of a violent nature accompanied by earthquake shocks, or they may consist of slow warping or folding. The well-known mica districts of eastern United States, India, and Africa are situated in such areas of relative stability.

Dr. Oliver Bowles, mineral technologist of the Bureau of Mines, is making a study of methods of production employed in the lime quarries of Virginia. Dr. Bowles recently outlined to the National Lime Association in Cleveland the proposed work of the Bureau of Mines for the lime industry.

New York Gravel Operation

2000 Tons Daily With a Power Drag Scraper

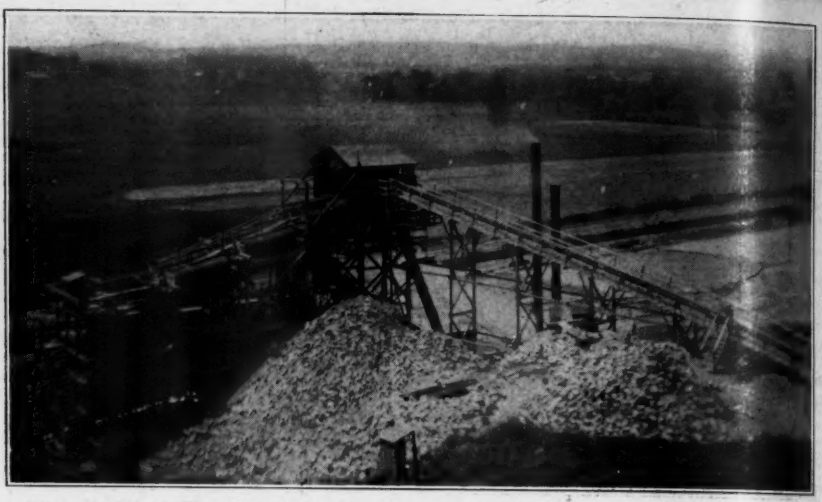
AT MACHIAS, New York, the Machias Sand and Gravel Company is producing about 40 cars of material per day. The record production of the plant is 58 cars or about 2,900 tons. The material runs about 60 per cent gravel and 40 per cent sand. The proportion of oversized is quite high and 40 per cent of the gravel is crushed. The sand and gravel occurring in a bank 100 feet high, are of glacial origin, partially cemented, and have a high compressive and tensile strength.

Excavation of material is handled by a Green power drag scraper of 3 yards capacity, operating over an average span of 200 feet. The anchor and dead men are located at the top of the 100 feet bank, operations extending from that point down to water level. The scraper is pulled by a 10x12 Lidgerwood double drum hoist using ⅞ inch load line and ⅝ inch return line.

When the scraper comes down from the bank loaded with material, it passes over a rail grizzly with 6 inch openings, located at the level of the hoist house as shown in the accompanying photographs. Material that passes the grizzly drops to a hopper with a capacity of 1½ carloads. From this hopper, the sand and gravel is taken out on an apron feeder to a 30 inch, 6 ply rubber conveyor belt 300 feet between centers. This belt elevates to a height of 70 feet, discharging at the screens. The belt speed is 200 feet per minute.

The plant has two screening units, each of which is independently operated and each of which consists of 3 cylindrical screens, 4 feet in diameter and 12 feet in length. The oversize is rejected by a jacket on the first screen, 8 feet in diameter and 8 feet long. This oversize is conveyed by chutes to a 10 inch Superior McCully gyrator crusher and is returned again to the beginning of the operations by a 14 inch Dull elevator.

When the material leaves the conveyor, it is met by a stream of water which gives it quite a thorough washing. Water is played on it again as it drops into the bins making thus a



View of Plant Showing Screening and Washing Equipment and Storage Bins

double washing operation which insures the production of clean materials.

The plant produces 5 commercial sizes, Number 1 gravel, ⅜ to ⅝; Number 2 gravel, ⅝ to 1½; Number 3 gravel, 1½ to 2¾; Number 1 sand, passing ⅛ inch openings; Number 2 sand, passing ⅜ inch openings. Sand operation is accomplished by 3 Dull 60 inch tanks. The power is furnished by a central steam

Conveyor Belt to Plant. Grizzly and Hoist House in Foreground

Grizzly, Hoist House and End of Conveyor Belt

plant and is transmitted by 1¼ inch manila transmission rope. The plant has an electrical installation to furnish light for night operations, for use in shop work, etc.

The water unit consists of a 70 horse power Erie steam engine driving 2 double volute Gould centrifugal pumps, which have 5 inch intake and 4 inch discharge. The capac-

ity of both pumps is 1,800 gallons per minute. The water is brought from Ischua Creek which has been dammed at one point and keeps full a diversion reservoir that insures 4 weeks' supply of water regardless of drought. Beside the plant, as shown in one of the illustrations, is a large settling basin into which the flumes carrying tail water from the plant discharge. After the water has been freed of sediment by settling, it passes over a spillway and back to the creek.

The Machias plant is operated by seventeen men and one superintendent. It is producing very fine grades of aggregate. New York state tests show it has the highest record concrete roads. The operation is made rather difficult at times by the presence of large boulders, some of which run as large as a ton. The photograph showing the hoist house and the end conveyor belt from the side

Showing Cut in Which Scraper Works

View of Green Power Drag Scraper

also shows a one-ton boulder on the grizzly to which it had been brought by the scraper.

Southern States Have Big Road Programs

In road building and street paving work the Southern states are showing greater activity than at any time in their history. Contracts reported during the past four months aggregate in value about $40,000,000. Every state in the South is showing tremendous progress, especially in road improvement. Contracts awarded in the last four months include, in value, the following: Alabama, $1,870,000; Arkansas, $842,000; Florida, $4,800,000; Georgia, $780,000; Kentucky, $870,000; Louisiana, $932,000; Maryland, $966,000; Mississippi, $844,000; Missouri, $2,735,000; North Carolina, $7,780,000; Oklahoma, $1,975,000; South Carolina, $1,104,000; Tennessee, $833,000; Texas, $6,657,000; Virginia, $690,000; West Virginia, $4,523,000.

In addition to the actual contracts awarded, there is a tremendous volume of highway improvements for which plans are being made and for which bids will be received during the year. An impressive amount of asphalt construction is under way in the South, especially in North Carolina, Tennessee, Texas, Florida, Kentucky, Arkansas, Oklahoma and West Virginia.

The Wayne Gravel Company has been organized at Ft. Wayne, Ind., for the purpose of buying and selling sand and gravel. The company has an initial capital stock of $10,000 and the organizers are H. L. Carrysot, F. M. Hogan and C. W. Hanna.

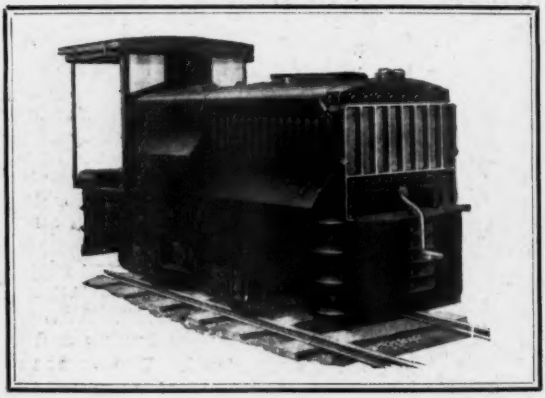
Snapped in the Quarri

EIGHT PLYMOUTH Gasoline Locomotives are moving in this Quarry like shuttles in a loom. Each Locomotive delivers its load from shovel to base of incline every 40 seconds, and over a distance of 600 track feet.

Frequently these Locomotives go on duty at 6 o'clock Sunday evening and run day and night until 6 o'clock Saturday evening without stopping the engine. An exceptional performance and a test of efficiency.

Verily, the PLYMOUTH is first in the field, first in performance, and first in the affections of the user. Ask us why.

THE FATE-ROOT-HEATH CO.,
PLYMOUTH, OHIO



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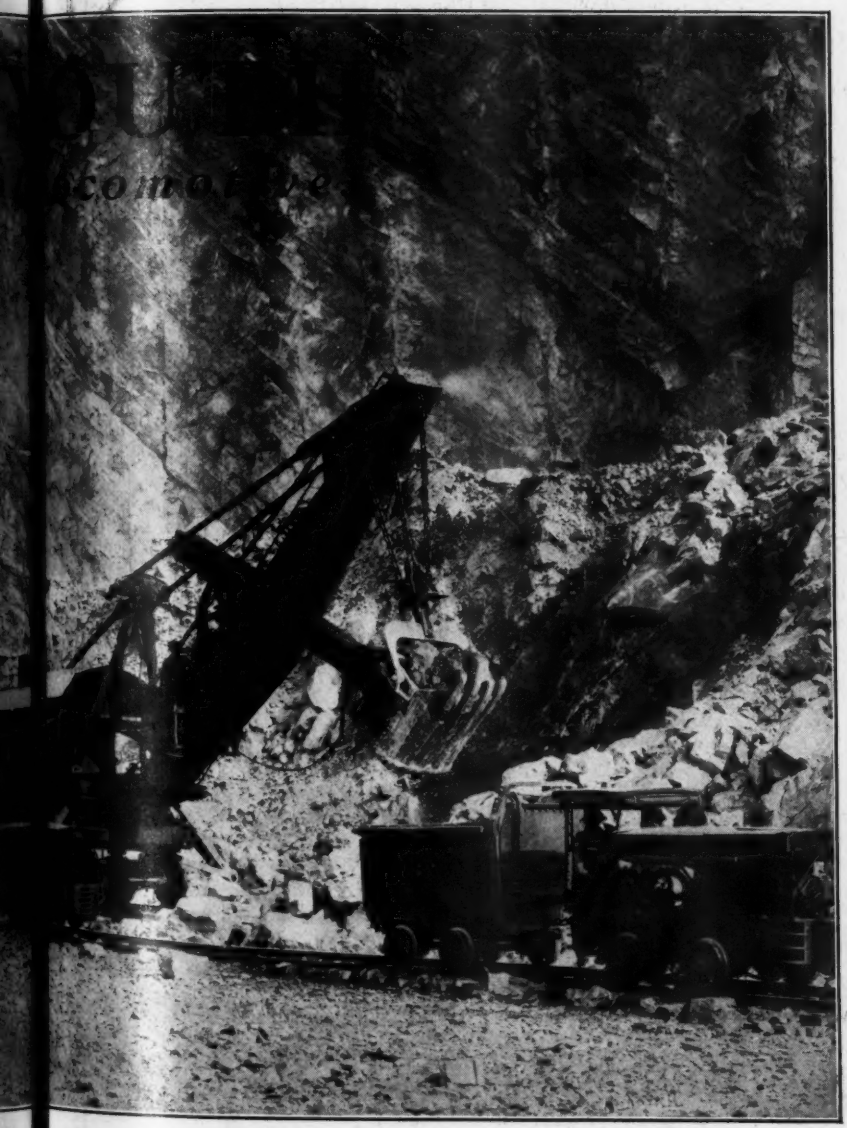
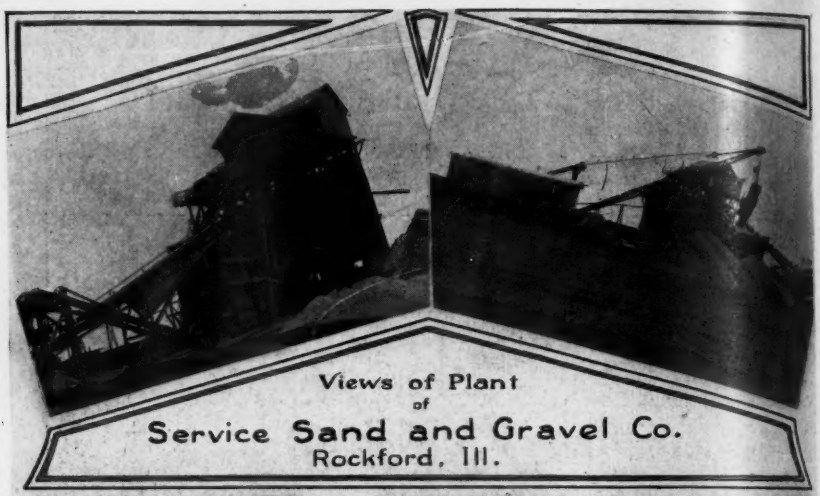
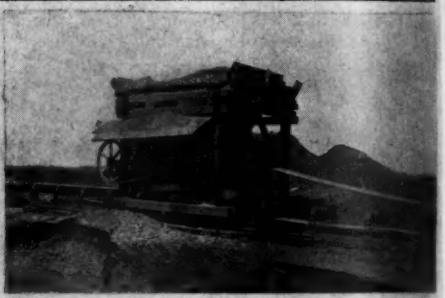
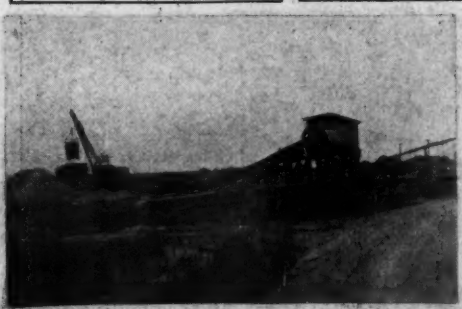
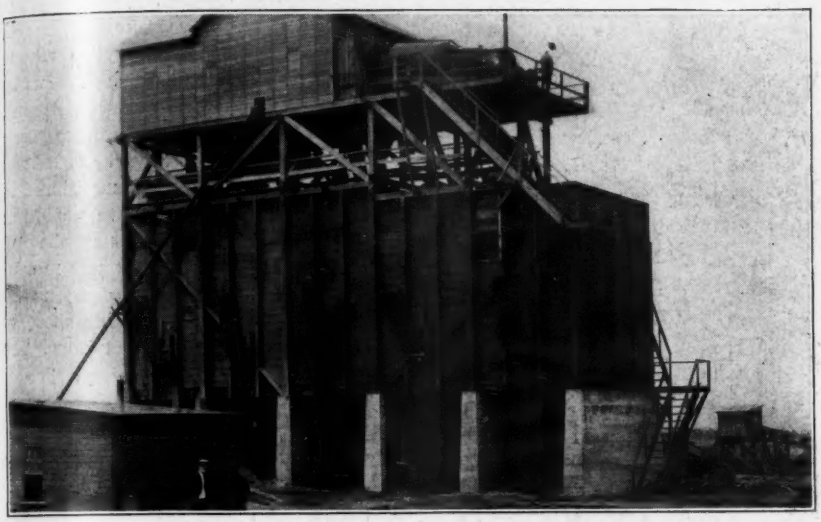




Views of Plant
of
Service Sand and Gravel Co.
Rockford, Ill.







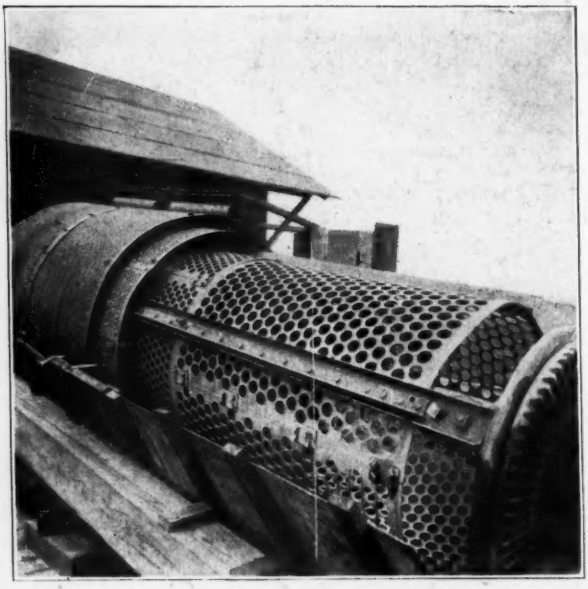
View from Back of Plant, Showing Spouts for Loading Cars

Service Sand and Gravel Co. Operates New Illinois Plant

A RECENT addition to the group of gravel plants around Rockford, Illinois, is that of the Service Sand & Gravel Company, with offices in that city. This plant, with a capacity of about 1,000 cubic yards per day, is located some 5 miles outside the city of Rockford over an extensive deposit of gravel bearing lands. The material is in fairly loose condition, and excavation is made correspondingly easier by reason of this. An amount of clay and silt is present, but this is quite easily washed out, and good clean grades of sand and gravel produced. As in the case of most sand and gravel deposits in that section of the country, the proportion of sand to gravel is very high, varying throughout the deposit from 60 to 70 per cent. Some 15 per cent of the gravel is oversize, and requires crushing.

The first operation at the plant, that of excavating the materials, is handled by a No. 3-T Monighan walking dragline excavator. This machine, which is able to walk in any direction, is equipped with a 3 cubic yard Page scraper bucket that handles all the work of stripping and excavating, going from one operation to the other without change of equipment. The Monighan dragline is equipped with a 60 foot boom and is powered by a 90 horse power internal combustion engine. Walking is accomplished by the turning over of large cams on walking platforms at the sides of the machine, this action lifting the dragline and moving it forward.

Material excavated by the dragline is deposited in a traveling field hopper designed by the Stephens-Adamson Co. of Aurora, Ill. This hopper, illustrated here by photo and sketches, serves the purpose of insuring correct, uniform and even loading of the belt conveyor running to the plant. It also makes possible loading onto the belt at



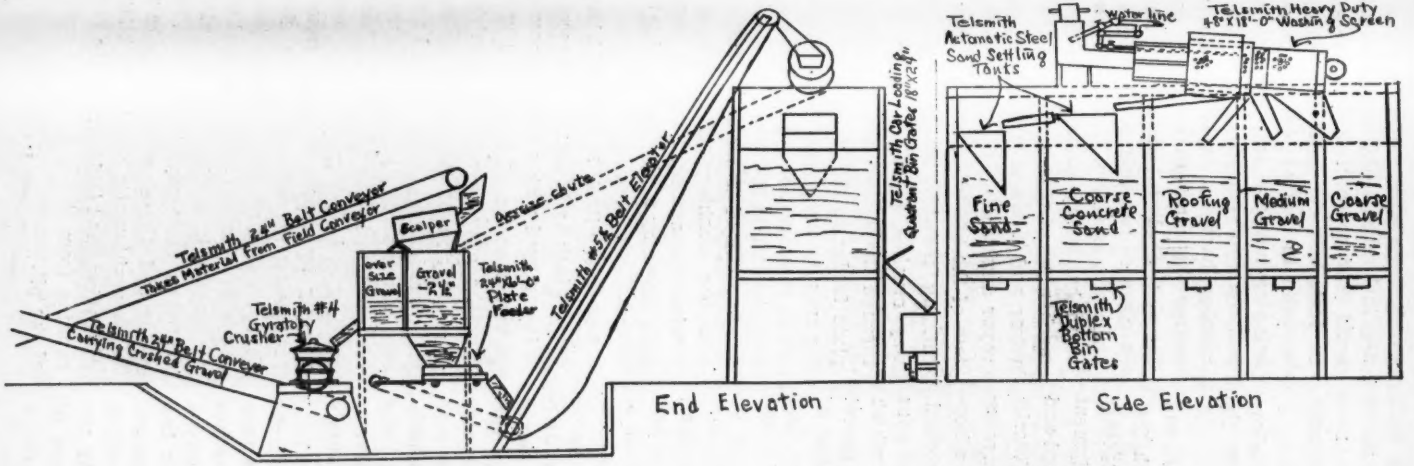
Telsmith Heavy Duty Washing Screen

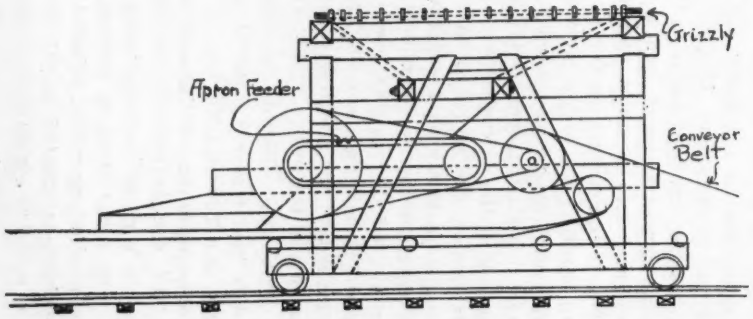
any position along its entire length.

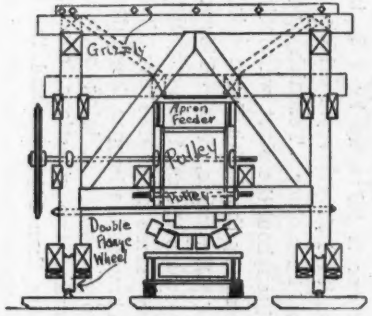
The essential features of the traveling hopper are a hinged grizzly, an apron feeder, pulleys for taking power from the conveyor belt to actuate the apron feeder, and a framework for the whole, to which are fitted wheels that run on tracks at both sides of the conveyor. The grizzly is made of ¾x4 inch bars spaced 8¼ inches between centers and extending over the entire top of the hopper, approximately 9 feet square. After the material which this grizzly passes has dropped to the hopper it goes to a 30 inch by 5 foot apron feeder traveling at about 20 feet per minute while the conveyor belt is traveling 200 feet. The method of securing this reduction is shown in one of the sketches. The belt conveyor is made to pass over two pulleys, to one of which the sprocket actuating the apron feeder is connected. With this arrangement it is possible to locate the hopper at any point along the conveyor belt that is most easily reached by the dragline.

The belt conveyor on which the traveling hopper discharges is 24 inches wide. The first section, that from the take-up end to a point where anotner belt running at right angles takes up the work, is 185 feet long. As mentioned in the last paragraph, this belt travels at the rate of 200 feet per minute. It has a carrying capacity, at this speed, of 150 tons per hour. The ball bearing carriers on which it runs are spaced 4 feet 3 inches apart; the return carriers, also ball bearing, are spaced 10 feet apart. Ball bearing guides are used, the upper spaced 20 feet apart, the lower 40 feet.

Telsmith No. 4 Gyratory Crusher







Above—End and Side Elevations of Service Sand and Gravel Co. Plant.

To Left—Side and End Elevations of Stephens-Adamson Traveling Field Hopper.

Power is supplied at the 36x26 inch head pulley by a 15 horsepower motor running at 900 revolutions per minute. Reduction is obtained through spur gears.

The field conveyor described above was also designed and built by the Stephens-Adamson Company.

Material discharged by the field conveyor is taken up by a 24 inch Telsmith Belt Conveyor which, together with other Telsmith equipment throughout the plant, was designed and built by the Smith Engineering Works of Milwaukee, Wis. This conveyor elevates the sand and gravel to a hopper some 25 feet above the ground. Through the hopper the material goes to a rotary scalping screen, which makes two selections, one of gravel less than 2½ inch, and the other of oversize gravel. The gravel less than 2½ inch is fed through the bottom of the bin to a Telsmith 24 inch by 6 foot plate feeder. This device regulates the supply of gravel to the plant, and insures a steady feed to the belt elevator into which it spouts that is just the correct amount for the elevator to handle. The proper working speed for this purpose is obtained by driving the plate feeder from the lower pulley of the belt elevator. The variations in the speed of the elevator and its capacity as a consequence to handle more or less gravel is immediately reflected in the speed of the plate feeder, and just the amount of gravel that the elevator can properly handle is fed to it.

This belt elevator, to which the plate feeder passes material less than 2½, is a Telsmith No. 5½. It reaches to the top of the washing and screening plant, discharging into the wash box at the head of the large rotary screen.

The other class of material which is selected, or rather rejected, by the scalper, is spouted to the bottom of an oversize bin to a Telsmith No. 4 gyratory crusher, which reduces to 2½ inch size. The product of this crusher is passed back by a Telsmith 24 inch belt conveyor in a direction opposite to that of the belt conveyor bringing material to the plant. This belt conveyor, carrying crushed gravel reaches back to a point a few feet nearer the plant than that at which the plate feeding belt conveyor begins to elevate. At this point there is a structure, as shown in one of the photographs, which contains the driving mechanism of the crushed gravel conveyor and a bin into which this conveyor discharges. A spout at the bottom of the bin feeds the belt conveyor running towards the plant. In this way crushed gravel is passed again through the scalper and is fed by the plate feeder to the No. 5½ belt elevator running up to the washing screen. When the material is deposited by the belt elevator in the wash box it is met by a stream of water which flushes it into the washing screen. When it reaches the screen it is again treated with water by a pipe running into the screen.

The screen itself is a Telsmith heavy duty 48 inch by 18 foot washing screen. It is equipped with a scrubbing section in which series of flights and lifters turn the gravel over and over. The other section of the screen produces three grades of gravel. Around a section of the screen just past the scrubbing section is a sand jacket. Coarse, medium and roofing gravel are passed directly by spouts to three separate bins below the washing screen. Sand that goes through the sand jacket drops first to an automatic steel and settling tank, at the bottom of which coarse concrete sand is drawn off. The water and the fine sand pass on to another automatic settling tank from which fine sand is drawn off, the water running from this point into a section of the pit.

The storage bins are equipped for both car and truck loading. Cars are loaded at the back of the plant through Telsmith 18x24 inch car-loading quadrant bin gates. Trucks are loaded from the bottoms of the bins through Telsmith duplex bottom bin gates. The Service Sand & Gravel Company operates 6 trucks between the plant and its local market at Rockford, also to nearby road-building and construction jobs.

The C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., has taken over from the Mono Corporation of America the manufacturing and selling rights of their entire line of gas-analysis instruments for use in the control of combustion and industrial furnaces. Mono automatic gas-analyzing instruments produce continuous graphic records of the percentages of certain gases present in varying gas mixtures. They promote economy in fuel consumption in boiler and gas producer plants and are also used to control chemical reactions in lime kilns, and chemical process work of all kinds.

Jet Heads Steady Pumping Operation

The accompanying reproductions of pressure charts from the Ward Sand & Gravel Company, Oxford, Mich., illustrate quite well the advantages derived by that company from the installation of jet heads in their new pumping plant, described in the July issue of PIT AND QUARRY. How this

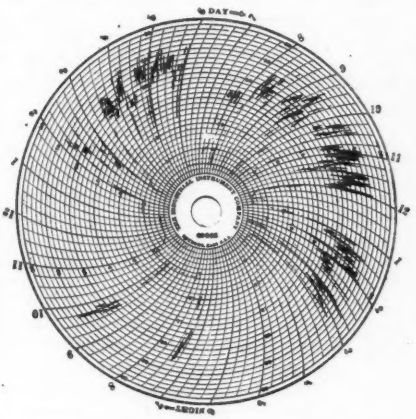


Chart Showing Unevenness of Operation Before Installation of Jet Head

jet heat steadied the operation is clearly shown. The illustrations, as a matter of fact, do not do justice to the original charts, which were in red ink

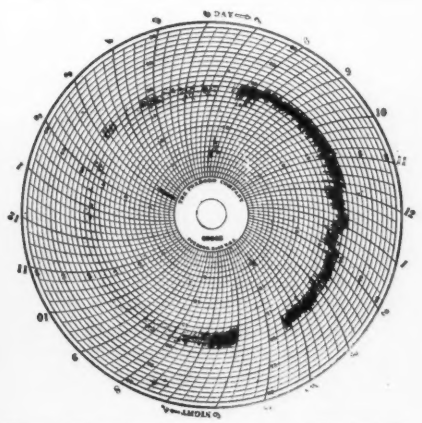


Chart Showing Evenness of Operation After Installation of Jet Head

and were not easy for the engraver to reproduce faithfully.

The jet heads at the Ward plant were furnished by the Morris Machine Works, Baldwinsville, N. Y.

Jet Head Before Installation at Plant of Ward Sand and Gravel Company

Western Cement Revision

A further revision of western cement rates has been ordered by the Commission to be made not later than October 27, on not less than thirty days' notice. In a second supplemental report on No. 8182, Western Cement Rates, and No. 11829, Nebraska Rates, Fares and Charges, opinion No. 7772, 69 I. C. C. 644-59, written by Commissioner Daniels, the Commission revised its findings in the original report, 48 I. C. C. 201, so as to require the application of an average of Scale II and III rates between points in Nebraska, Kansas and Missouri in that part of Scale III territory in the states mentioned; also so as to require rates in scale IV territory not more than 120 per cent of the rates prescribed in this report for the part of scale III territory mentioned.

In connection with the report in this case the Commission revised fourth section order No. 7260, originally entered May 27, 1918, and modified March 31, 1919, by striking out the second paragraph and inserting in lieu thereof three paragraphs. The first of the three authorizes the carriers having circuitous routes, that is routes not less than 15 per cent longer than the short line from the Kansas gas belt producing points, including Dewey, Okla., to maintain rates to Kansas City, St. Louis, Omaha, and Sioux City, the same rates as the short lines, subject to the equi-distant rule. The second says, that the carriers, except as to the carriers mentioned in the first paragraph, are authorized to maintain rates the same as the short line routes, provided the rates at the intermediate points shall not exceed the rates prescribed in scales, nor violate the aggregate of intermediate part of the long and short haul paragraph. The third substitute paragraph denies all other fourth section relief, as of October 27, the day on which the two new scales are to be made operative.

The table shows the distance rates to be applied under the findings herein (a) between points in Scale II territory; (b) between points in Scale III territory in Missouri, Kansas, and Nebraska, and between points in Scale III territory aforesaid and points in Scale II territory; (c) between points in Scale IV territory in Kansas, Nebraska, South Dakota, Colorado, Montana, and Wyoming; (d) between points in Scale II territory and points in Scale IV territory; and (e) between points in Scale III territory aforesaid and points in Scale IV territory. There are included in these scales reductions under Reduced Rates, 1922:

	A	B	C	D	E
			Scales.		
Miles.	II	III and bet. II and III	IV	Bet. II and IV	Bet. III and IV
5 miles and less	7	7.5	9	7.5	8.5
10 miles and over 5	7	8	10	8.5	9
15 miles and over 10	7	8	10	8.5	9
20 miles and over 15	8	8.5	10.5	9	9.5
25 miles and over 20	8	8.5	10.5	9	9.5
30 miles and over 25	8	8.5	10.5	9	9.5
35 miles and over 30	8.5	9	11	9.5	10
40 miles and over 35	8.5	9.5	11.5	10	10.5
45 miles and over 40	8.5	9.5	11.5	10	10.5
50 miles and over 45	9	9.5	11.5	10	10.5
55 miles and over 50	9	10	11.5	10.5	11
60 miles and over 56	9	10	11.5	10.5	11
65 miles and over 61	10	10.5	12.5	11	11.5
70 miles and over 66	10	10.5	12.5	11	11.5
75 miles and over 71	10	10.5	12.5	11	11.5
80 miles and over 76	10	11	13	11.5	12
85 miles and over 81	10.5	11.5	13.5	11.5	12.5
90 miles and over 86	10.5	11.5	13.5	11.5	12.5
95 miles and over 91	10.5	11.5	13.5	11.5	12.5
100 miles and over 96	11	11.5	14	12	13
110 miles and over 101	11	11.5	14	12	13
120 miles and over 111	11.5	12	14.5	12.5	13.5
130 miles and over 121	11.5	12.5	15.5	13	14
140 miles and over 131	11.5	13	16	13.5	14.5
150 miles and over 141	12	13	16	13.5	14.5
160 miles and over 151	12	13.5	16	14	15
170 miles and over 161	12.5	13.5	16	14	15
180 miles and over 171	12.5	14	16.5	14.5	15.5
190 miles and over 181	13.5	15	18	15.5	16.5
200 miles and over 191	13.5	15	18	15.5	16.5
210 miles and over 201	13.5	15	18	15.5	16.5

220 miles and over 211	14	15.5	18.5	16	17
230 miles and over 221	14	16	19	16	17.5
240 miles and over 231	14	16	19	16	17.5
250 miles and over 241	14.5	16	19.5	16.5	18
260 miles and over 251	14.5	16.5	20	17	18.5
270 miles and over 261	14.5	16.5	20	17	18.5
280 miles and over 271	15.5	17	20.5	17.5	19
290 miles and over 281	15.5	17	20.5	17.5	19
300 miles and over 291	15.5	17.5	21	18	19.5
310 miles and over 301	16	17.5	21	18	19.5
320 miles and over 311	16	18	21.5	18.5	20
330 miles and over 321	16	18	21.5	18.5	20
340 miles and over 331	16	18.5	22	19	20.5
350 miles and over 341	16	18.5	22	19	20.5
360 miles and over 351	16	19	22.5	19.5	20.5
370 miles and over 361	17	19.5	23.5	20	21.5
380 miles and over 371	17	20	24	20.5	22
390 miles and over 381	17	20	24	20.5	22
400 miles and over 391	17.5	20.5	24.5	20.5	22.5
410 miles and over 401	17.5	20.5	24.5	20.5	22.5
420 miles and over 411	17.5	20.5	24.5	20.5	22.5
430 miles and over 421	17.5	20.5	24.5	20.5	22.5
440 miles and over 431	18.5	21	25	21.5	23.5
450 miles and over 441	18.5	21	25	21.5	23.5
460 miles and over 451	18.5	21.5	26	22	25
470 miles and over 461	19	21.5	26	22	24
480 miles and over 471	19	22	26.5	22.5	24.5
490 miles and over 481	19	22	26.5	22.5	24.5
500 miles and over 491	19.5	22.5	27	23	25
520 miles and over 501	19.5	23	27.5	23.5	25
540 miles and over 521	20.5	23.5	28	24	25.5
560 miles and over 541	20.5	24	29	24.5	26.5
580 miles and over 561	20.5	24.5	29.5	25	27
600 miles and over 581	21	25	29.5	25	27.5
620 miles and over 601	21	25	30	25.5	28
640 miles and over 621	22	26	31.5	26.5	29
660 miles and over 641	22	26.5	32	27	29.5
680 miles and over 661	22.5	27	32.5	27.5	29.5
700 miles and over 681	23	27.5	33	28	30
720 miles and over 701	23	28	33.5	28	30.5
740 miles and over 721	24	28.5	34	29	31.5
760 miles and over 741	24	29.5	35	29.5	32.5
780 miles and over 761	24.5	29.5	35.5	29.5	33
800 miles and over 781	25	30	36	30	33.5
820 miles and over 801	25	30.5	37	30.5	34
840 miles and over 821	25.5	31	37.5	31.5	34
860 miles and over 841	26	31.5	38	32	34.5
880 miles and over 861	26	32	38.5	32	35
900 miles and over 881	26.5	32.5	38.5	32.5	35.5
920 miles and over 901	26.5	33	39.5	33	36.5
940 miles and over 921	27.5	34	40.5	34	37.5
960 miles and over 941	28	34	41	34	38
980 miles and over 961	28	34	41	34	38
1,000 miles and over 981	28.5	35	42.5	35	38.5
1,020 miles and over 1,001	28.5	35	42.5	35	38.5
1,040 miles and over 1,021	29.5	36	43	36	39.5
1,060 miles and over 1,041	29.5	36.5	43.5	36.5	40
1,080 miles and over 1,061	29.5	37	44	37	40.5
1,100 miles and over 1,081	30.5	38	45.5	38	42
1,120 miles and over 1,101	30.5	38	45.5	38	42
1,140 miles and over 1,121	31	38.5	46	38.5	42.5
1,160 miles and over 1,141	31.5	39	47	39	43
1,180 miles and over 1,161	31.5	39	47	39	43
1,200 miles and over 1,181	32.5	40	48	40	44

—Traffic World.

The Penglass Engineering Company, incorporated in Indiana with headquarters at Grayville, Ill., has bought the steamer Melvin, formerly owned by the Flesher Sand and Gravel Company, of St. Louis, and the boat has been registered at Evansville, Ind. The consideration was not made public. The Penglass Company is engaged in the sand and gravel business on the Wabash river and Evansville capitalists are interested in the venture.

The Wayne Gravel Company, Fort Wayne, Ind., has been incorporated with a capital of $10,000 to buy and sell gravel, sand, etc. The directors are: H. L. Carrysot, F. M. Hogan, C. W. Hanna.

The Millwood White Sand Company, Jackson, Ohio, has been incorporated with a capital of $120,000. The incorporators are: D. H. Armstrong, D. F. Shaffer, J. H. Klett, E. R. Davis, and W. E. Hassey.

Methods of Breaking Boulders

A READER writes asking about various methods of breaking boulders in quarries and particularly those that are most economical. He states that he has found breaking boulders by block holes and "adobes" very expensive.

The breaking of boulders is a perpetual question in quarrying so that information on the subject is continually being sought. There are a number of different methods of breaking, some of which are applicable to some operators, while others cannot be used economically.

The methods can be divided into two classes:

First. Breaking by means of explosives.

Second. Breaking by means of hand or mechanical power.

There are these ways of breaking boulders by means of explosives:

a. The most common method is that known as "adobing" which consists of placing sticks of dynamite on top of the boulder and a considerable amount of mud on top of the explosives. It is from this that the shot takes its name.

b. The second method is that known as "block holing." In this case, the boulder has a hole drilled in it and the explosives tamped into the hole and mud placed on top of it.

c. The third method is known as "undermining." This is done by placing the charge of dynamite under the boulder and using dirt or mud to confine it before exploding the charge. This method is not used as much as the other two.

The most expensive of these three methods is the first mentioned. The operation, though, is done much quicker and for this reason it must be used at times, but it should not be used if there is time available to break the boulders by other methods. It can be seen that when a large blast is made and a number of boulders are in the way of picking up the broken rock, that a few "adobes" will quickly break them up. However, many operators use this method to break up the majority of their boulders.

This is a mistake as the block holing method is not only cheaper but much more effective. This is due to the fact that the explosive is confined much better and the full disruptive force is obtained against the rock, so that it is broken up finer with a smaller charge of dynamite.

For instance with a fair sized boulder containing from one to two cubic yards, two to three pounds of powder will have to be used to break it, while the same boulder could be broken with a block hole with one pound or less.

To understand why this is true it must be remembered that explosives exert pressures in all directions with equal force, but do their most effective work in the direction of least resistance. This means that when dynamite is laid on top of a rock that at least one-half of its force is wasted on the air, causing a great concussion and a loud report. Then there is a certain force lost in the rebound of the explosive against the rock, as the discharge of powder acts in a gun.

With the block hole the dynamite is so confined that nearly 100 per cent of its disruptive force is effective on the rock, so a much smaller charge does the work. Today with a plug or jackhammer drills the holes can be drilled from 6 to 24 inches deep at small cost, and much quicker, than some years ago, when such drilling had to be done by hand drills or a tripod machine. The cost too, is less, yet in the bygone days block holing was always from 25 to 50 per cent

cheaper than breaking with adobe shots.

Even block holing is cheaper than undermining, yet the latter costs less than adobes. This is due to the fact that the powder is confined better and the hard floor of the quarry causes the forces to rebound against the boulder, lifting it and helping to break it, as more than half the force is used up against the boulder itself.

It is necessary to place the powder well under the boulder and use plenty of mud to confine it. This can sometimes be done by making a hole with a bar under the boulder or by lifting up the boulder and placing the charge under it with the mud around it, and then allowing the rock to come back on top of the charge. The cost of undermining will average between that of block holing and adobing, the only objection to it being that it causes the rock to be lifted in the air and at times thrown to great distances.

This method of breaking boulders can be as quick as that of adobing, but as a rule it takes a little more time.

There are two other methods of breaking boulders:

d. With hand sledges.

e. With derricks and a ball or weight.

The sledging of rock needs no description, but it is well to state that with wages not exceeding 50 cents an hour, most boulders measuring a cubic yard or less can be broken cheaper than with explosives. Larger boulders will cost more and it is not practical to attempt to break them by sledging. It is difficult to set a distinction as to size of boulders to sledge, for their shape as well as size must be considered and the character and hardness of the rock plays an important part.

Even with very large boulders it is not necessary to use explosives if the quarry is equipped with a derrick, for boulders up to 5 or 6 cubic yards can be broken with a ball or weight. This method has been described in PIT AND QUARRY and it is only necessary to state that when it can be used it is far cheaper than breaking with explosives.

If quarries equipped with large steam shovels and the larger sizes of crusher, the breaking of most of the boulders at the ledge is eliminated, but in other quarries boulders must still be broken.

The cost of boulder breaking should be kept accurately so as to reduce it whenever possible, as this cost is frequently excessive in some quarries.

All-Steel Drill Outfit

The Armstrong Manufacturing Company, Waterloo, Iowa, has a successful record as drill manufacturers, covering a period of more than half a century.

Their new all-steel outfit is the result of more than three years constant study, work and improvement. It is built entirely of steel, except the band wheel and two sets of the larger bearings. The frame is built of angle steel on a heavy channel steel frame or chassis and there are no bolts in any part of it—every joint is hot riveted. It is built like a steel truss bridge, and found to be true and rigid even after being subjected to excessive and unusual warping or twisting strain. Being made entirely of steel, this rig is not susceptible to injury if hit by a chance stone from a blast.

Yet the frame—the backbone of the rig—is only one of its unusually good features. It is equipped with either electric or gasoline power at the option of the buyer. It has an all steel derrick fitted with the Armstrong patents covering the use of wire line instead of Manila cable. This item in itself is one worthy of special mention, especially when you consider that a three-fourths inch wire line will last four or five times as long, thus reducing the cable cost per foot drilled to a minimum. This all steel rig is so designed and constructed that the speed with which it will penetrate rock formations will mean a big saving in the cost of drilling blast holes.

Value of a Minute

A MINUTE is a short space of time, while a second is little more than the time in which to take a short breath; yet it is surprising how much can be accomplished in a minute, and if seconds are used instead of being wasted, how much work can be done in a few seconds.

A man can hit a blow with a pick or sledge every four seconds. A shovel full of dirt or broken stone can be cast or loaded into a low type of mine or quarry car in four seconds. An automobile truck can travel 68 feet in four seconds. A modern crusher of fair size can produce a tenth of a ton of stone in four seconds. A 2½ yard steam shovel can load two-thirds of a cubic yard into a car in four seconds.

A much longer list could be given, but these are sufficient to show the value not only of a second but also of a minute.

Machines and men cannot be speeded up, and the cost of work reduced, unless the operator realizes the value of both a minute and a second.

A man can throw a shovelful of dirt or stone into a low car not over 30 inches high in four seconds or fifteen shovels in a minute, even allowing a few seconds for a man to spell himself. Raise the height of the car and less work is done. A car 36 inches high means a man will load only eleven or twelve shovelsful per minute. A car 4 feet 6 inches high can be loaded at the rate of nine shovels per minute. One 5 feet high at the rate of seven shovels per minute or one shovelful in about nine seconds. These facts show the need of selecting low type cars for hand loading; yet the writer has known quarrymen to select cars 5 feet or more in height for hand loading. A costly mistake showing a lack of knowledge of the value of time and also of the work that a man will do in foot pounds raised vertically. He will do less work raising weight vertically than in any other way.

On the other hand the opposite principle is involved in loading cars with a steam shovel. In loading the dipper, it is raised to the top of the boom, and as cars would be broken by dumping the load into them with dipper up to its full height, it is necessary to lower the dipper in order to dump it. Consequently a very low car means that time can be wasted in loading them. It is true that as the boom is swung the dipper can be lowered, and for ordinary heights of cars this is done, but when very low cars are used, it also means the cars are of small capacity so that after the dipper is centered over the cars it must be lowered.

This is one of the time studies in loading with shovels, but a more important study is in keeping cars or vehicles under the shovel to be loaded. Even with small shovels it is possible to load two to three cubic yards of material, loose measurement, in a minute; so that seconds count in this work, and every minute that the shovel is idle means not only waste of money as far as the machine is concerned but likewise the output for the day is reduced.

The same principle is involved in handling trucks. At their minimum rated speed they travel 68 feet in four seconds or 17 feet per second, and it is possible even to travel faster than this. Even at this rate, it means that 120 miles can be traveled in a 10 hour day, and it means that it is necessary to make time studies and use the best of management to keep trucks traveling.

Let us consider some costs. Say a 5-ton truck can be operated at a cost of $2.00 per hour and it makes ten trips per day with its rated load of 5 tons, traveling with its load

four miles and returning empty. Thus the truck travels 40 miles with the load of 80 in the day, carrying 50 tons at a total cost of $20. Thus the cost per ton is 40 cents, while the cost per ton mile is 10 cents.

If care and attention are not given to the size of the loads and only an average load of 4 tons is carried then the cost per ton mile would be 12½ cents. If on the other hand the loads can be made 6 tons, making the trucks carry a 20 per cent overload at the same speed, the cost per ton mile is reduced to 8⅓ cents.

Now if the loads are kept at the maximum and time studies are made to load and unload quickly so that an extra trip is made in a day the cost per ton mile would be but 7½ cents, while if enough time was saved to make twelve trips in 10 hours, traveling 96 miles in a day, the cost per ton mile with the loads would be less than 7 cents. (Note: as a truck generally travels light in one direction in delivering stone, sand and gravel, the cost per ton mile as figured here is only one half the amount it would actually be in order to find the actual cost of handling. We are only interested in showing the general principle of conserving time.)

Even with the cost figured as less than 7 cents there is in theory two hours out of the ten that the truck is not moving, showing that on an average ten minutes are consumed in loading and dumping the truck for each trip.

This fact shows the need of automatic dumping, and the use of some mechanical means or gravity chutes for quick loading. It is here that time is lost. Trucks should never have to wait for their loads, and when loaded they should not be compelled to wait for weight slips or delivery tickets. Each minute, each second means to add to the hauling costs. Tickets can be made out ahead of time with everything on them except the gross weight which can be added in a second, and there should be some means of handing the driver these slips without anyone wasting much time in walking.

Some truck owners have found it well worth while to study these matters not only to save minutes but likewise seconds, for with short hauls seconds can count nearly as much as minutes do on long hauls.

In the past units of work done have been considered on a day's basis. There has been a tendency to get down to a closer basis by using an hour for records and comparison, but the day has come when the minute must be considered and in many operations a second must be the basis of doing work. This is especially true of machines which do not tire, for men and horses must be afforded time to spell themselves at frequent intervals.

Speaking of horses (and they must still be used for some work), money is frequently lost in hauling by having slow walking animals. Horses' speed will vary considerably in walking on a level with heavy loads. The writer has found that some heavy draught animals will go at a speed of 200 feet or less per minute, some as slow as 175 feet only, while other horses will carry the same load as rapidly as 225 feet per minute, and a few go as fast as 300 feet. This means speeds varying from 3 to 5 feet per second. It is evident from this, that in purchasing animals for hauling, slow walking ones should not be selected.

It can be seen from all the examples cited that a minute is of greatest value. There is an old adage that says, "Time is gold.

This is as true today as when first written; and as each decade passes, and competition becomes keener and business principles are made closer, the value of minutes becomes more real.

Some Notes on Blasting

BY DANIEL J. HAUER.

THE initial blast that loosens the rock from the ledge is known as primary blasting. Those blasts that must be made afterwards, in order to break up the loosened rock, are known as secondary blasting.

The cost of secondary blasting in quarries must depend upon how well the primary blasting is done, and to what extent the rock must be again broken. Thus it is evident that no matter how well a primary blast is made, if the stone must all be picked up by hand and fed into a 16x20-in. jaw crusher, the cost of breaking up this stone by secondary blasts will be much higher than if the stone is to be picked up by a large steam shovel and served to a 64x86 crusher.

In two quarries of the same kind of stone, being used to feed the same size and kinds of crushers, the cost of secondary blasting will depend entirely upon how well the primary blasting is done.

Thus the object of primary blasting should be to loosen and throw down the greatest tonnage or yardage with a pound of explosives, and at the same time break it up into usable sizes.

There three factors in obtaining the best results:

1. The spacing and depth of the blast holes.
2. The kind of explosives used in the holes.
3. The size of charges of explosives and how they are placed.

These three factors govern any kind of blasting. The best expert in the world can not do good work with any kind of explosives unless his holes are properly spaced. This is the beginning of all successful blasting; yet in spite of this in writing about blasting much has been said and written about the use of explosives, how to spring holes, how to lead, and regarding stemming, and many other details, yet one seldom finds any advice on how to space holes. The reason for this is that most believe that it is a matter of individual judgment as to how holes should be spaced, varying with the kind of rock to be blasted.

In spite of this, these very men, when planning a blast, will follow certain rules of thumb in deciding upon how to space their holes, and to what depth they should be taken. Likewise the charge is estimated in the same manner and with but little variation the load so decided upon is used.

The writer has contended for some years that if each man uses some rule to decide upon these features of blasting, then it is possible to derive a formula that can be used for the same purpose. Such a formula should be used with discretion, but so should any rule for plasting. The writer promises to make public in PIT AND QUARRY such formulae as he has gotten up and used successfully so that others may have the benefit of their use.

In order to know what is efficient blasting, one must know what work a pound of explosive can do. Some years ago the basis of all blasting in quarries was black powder, but today the most frequently used explosive in quarries is dynamite. Thus dynamite of 40 per cent grade or strength is now used as a basis. Authorities differ as to what a pound of such explosives will loosen. It is not a question of what they do loosen, but rather what they should, so that comparisons can be made with a standard to see what efficiency is obtained.

There are many things to consider in determining a standard or basis of

comparison. The depth of the hole is one, for efficiency cannot be obtained from shallow holes, and almost anything less than 20 feet can be considered shallow, especially today when we have the modern system of drilling deep blast holes.

A second consideration is that holes are supposed to be properly sprung. The powder used in the springing is included in with that loaded, so as to figure the work of every pound. It is likewise supposed that the holes are stemmed and that two or more holes are blasted at one time so as to obtain the concerted action of all the powder used.

It is not the idea to put the figures excessively high but to name instead a conservative yardage that can actually be done and also a figure than can be reached under ideal conditions.

We then have the following:

Soft Sand Stone	3	to 4	cu. yd.
Hard Sand Stone	2½	to 3½	cu. yd.
Dolomites	3	to 4	cu. yd.
Limestones (soft)	3	to 4	cu. yd.
Limestones (hard)	2½	to 3½	cu. yd.
Serpentine Rocks	2½	to 3½	cu. yd.
Schists	2¾	to 3¾	cu. yd.
Gneiss	2½	to 3½	cu. yd.
Trap Rock	2¼	to 3¼	cu. yd.
Granite (hard)	2	to 3	cu. yd.

The first column gives figures that should be equaled in most heavy blasts; the second column shows figures that can be obtained under the best conditions. However it must be stated that few published reports of large blasts in quarries show efficiency equal to these figures, either for deep hole blasting or tunnels. The reason for this is not easily explained, for it would seem that such blasts should be efficient, yet the writer believes there are hundreds of blasts put off in quarries that are economical that no one but those concerned ever hear of, while these "show" blasts seem to be planned in an extravagent manner.

The efficiency of a primary blast, as has already been pointed out, is not alone dependent on the number of cubic yards or tons it loosens, for it is necessary to break the rock up fine enough to be loaded and crushed.

To obtain this end, it is frequently necessary to plan a blast so as to break up the charges. To drill extra holes for this purpose would add considerably to the cost, so the only way to break up a charge is to place it at different elevations in the holes. Thus the main part of a charge would be in the bottom of the hole. Then a part of the charge is reserved to go about midway in the hole and another part near the top of the hole.

By this method, and shooting all the charges simultaneously, part of the weight is taken off the charge placed at the bottom. This causes this charge to have more rending force. Then too, instead of the top of the ledge being thrown down in large boulders, the charges placed in the barrel of the holes break up these pieces. It is thus made evident that the cost of secondary blasting can be greatly reduced by giving the proper attention to primary blasting.

The writer has visited quarries where the secondary blasting cost as much and even more than the primary blasting, while in other quarries it has been kept as low as 10 per cent of the cost of primary. In the writer's opinion, it should never exceed 50 per cent, and it is possible to keep it down to 10 per cent or less if the blasting is done with the proper forethought and care.

It is in this sort of work that many quarries waste so much money, more in some cases than the profit that is being made; in fact profits have disappeared altogether due to extravagent blasting. Unfortunately many quarrymen resent having their attention called to such matters. No doubt many readers after glancing at this article or reading a part will say with

great contempt, "the ideas of a theorist," and thus dismiss the subject from their minds instead of investigating to see if they can save themselves money.

One quarry man when his attention was called to these matters said in an emphatic manner, "Do you mean to tell me that some one can come here and show my men how to blast rock? My men are the best I can get. I don't want anybody around to teach them." An expert would not have had a difficult job to improve the blasting in this man's quarry, yet he in his ignorance was satisfied.

There was a time, as already noted when black powder was used extensively in most crushed stone quarries for primary blasting, but today many quarrymen use dynamite only, seldom even springing the holes.

One quarryman, in writing of his blasting, in a recent issue of PIT AND QUARRY, stated that he had gotten good results in using black powder and dynamite. It can be understood that cheaper and possibly better blasting was done, for in most cases it is an error, in the writer's opinion, to use dynamite for quarry blasting, but it is likely that even better results can be obtained if all black powder was used instead of mixing the two.

The trouble in mixing two such powders is that black powder is a low explosive, while dynamite is a high explosive. Thus they will not mix, nor will they go off together if exploded with a single detonator. For these reasons the mixed explosives do indifferent work. For large heavy blasts, black powder does excellent work, but it is more dangerous to handle than dynamite. Many quarry men could save themselves money by using black powder instead of the much higher priced dynamite.

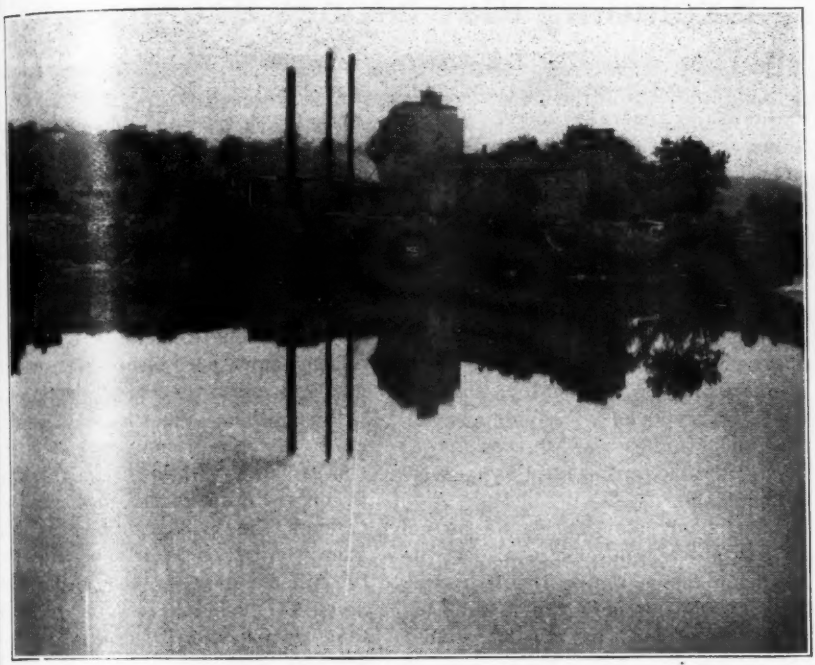
Judson powder will also do efficient work in heavy blasting, but it like black powder should be used without being mixed with dynamite. Nor should black powder and Judson be mixed. Each explosive should be used by itself, although a stick of dynamite with a cap in it can be used as a primer for both the black powder and Judson.

Many accidents in blasting have been caused by the mixing of these explosives, frequently killing one or more men. The writer has unfortunately had to do with such accidents. The wasting of explosives in this way can be strikingly told from an experience of the writer's. He was making a large blast and ordered in this case that dynamite be used, as the rock would not spring sufficient to get enough black powder in the holes to do the work. In his absence the foreman loaded into the holes a number of cans of black powder then filled the holes nearly to the top with dynamite.

The writer was on hand to see the holes shot. The dynamite blew down most of the rock, exposing the holes. Then the black powder caught fire from the blast, and for more than five minutes by the watch, this powder burned in the open air as shown by the bluish red flame.

Thus every can of black powder used was wasted, and the foreman, who said he only used dynamite, was surprised when discharged and told that he used black powder as well, and later from the magazine record was told the number of kegs of powder he had used. He declared the boss was spying upon him, little realizing that anyone experienced in such matters could tell by the appearance of the blast, and even in some cases by the report made.

The Lake Weir Washed Sand Company, Jacksonville, Florida, has changed its name to Ocala Limerock Company. No change in the officers of the company have been made.



Old Sand Pit Made into a Lake

Novel Use for Abandoned Sand Pit

By William L. Grovers

Ottawa, Ill., is known as the largest sand-producing city in the world, because the purest silica sand is found here in unlimited deposits. It is the only city that produces 99 per cent pure silica sand. The largest glass companies of the country use Ottawa sand. This statement speaks for itself.

One pit in this vicinity has been worked and is now useless. This huge pit is gradually filled with clear water and in one section of the pit the true depth of the water has never been determined. The depth of this section is estimated to pass the hundred foot mark. In the summer time the boys find the pit to be a good place to take an occasional swim.

In the fall of 1921 the pit was stocked with approximately one million fish of several varieties, including a number of trout and bass. In about two years the pit will be a very popular "fishing hole" as well as "swimmin' hole."

Ottawa, though situated on the banks of two rivers, is not a town for fishermen to try their luck. The Illinois River was the second best river for fishing in the United States but the chief inhabitants of its waters at present are carp. Gars inhabit the Fox River around Ottawa and drive the fish up stream. There is no good fishing within twenty miles of Ottawa on the Fox River. Thus it is easily seen that within the next few years the sand-pit will prove very popular with fishermen.

J. Thompson Brown has been appointed General Manager of the Explosives Department of E. I. du Pont de Nemours & Company to succeed the late Charles A. Patterson.

Mr. R. M. Bates, vice-president of the Bates Valve Bag Company, Chicago, recently sailed from New York to take charge of the London office of the company.

Excluding Flat Stones From Gravel

IN certain sections of the country where sand is dredged from rivers there is generally mixed with it some gravel. In some cases the gravel is in excess of the sand and there is little if any demand for the gravel while more sand can be sold than produced.

In many cases the remedy has been to increase the size of the dredges and as the gravel is screened out, discharge it again into the river. Thus if more than 50 per cent of the product is gravel, half the money spent for production is wasted, making the cost of producing the sand twice what it should be.

The remedy for this should be not an overproduction of gravel, but instead the crushing of gravel into sand. This means not only the installation of a crusher but also a sand grinder and pumps to supply water for the washing and grinding.

A crusher for this purpose is not sufficient even if set close, for it will not make sand of a large percentage of the gravel. If all the gravel is small then the crusher may be eliminated but if the gravel runs large then crushing must first be done.

One obstacle to overcome in connection with this grinding and crushing is to eliminate such pieces of stone as will not make a good quality of sand.

If the percentage of such stone is small it can go through with the rest of the gravel and be ground up into dust as it is likely to affect the sale of the sand unless it is such a color as to discolor the product.

If the amount of such stone is too great for grinding then one way of getting it out is the method followed in picking slate from anthracite coal at some mines. That is, letting the gravel run through a chute or over a conveyor to the crusher or grinder, and boys at a low wage are given a safe place to stand or sit and pick out the unsuitable stone as it passes them. This is a fairly cheap and satisfactory method.

If these objectionable stones are flat and narrow it is possible to eliminate them by passing them from a chute to a conveyor by having a grill of some fair length, made of round bars. These bars are placed far enough apart to allow the flat pieces to slide through them edgewise, but not so close that the round pebbles of the smaller sizes will go through the grill. In order to make the flat stones go through the grill and prevent them from sliding on their flat sides over the tip of the bars, the grill section must be made to rock or shake so that the mass of stone will be so agitated as to turn over all the stones as they are passing over the grill. With a fair length of section of grillage, few if any flat stones will come out of the grillage, but will drop through and can be carried away from beneath the grill in a hopper-shaped chute.

It is true that some of the finest sizes of the gravel may also go through the grill, but this waste may be insignificant and by eliminating the objectionable stone a first-class product is produced.

Square or flat bars of iron will not answer the purpose as well as round bars, for the flat pieces of stone will lay flat on these pieces much easier than on the ground bars and will thus be carried over the grill.

It is not necessary to construct a home-made or makeshift shaking or rocking section, but a regular shaking section of a screen can be purchased and the screen mesh taken off the frame and the bars substituted for it

Thus a well designed and built shaking section can be installed that will not only do the work, but will be durable. This method is not untried and will be found practicable and cheap.

A suggested method that the writer has never seen tried out, but may work, is the idea of feeding the gravel to a crusher through a chute, sliding thinly down such a slope that the round pebbles will go down it rapidly, while the flat stone will move slowly on their sides. Near the bottom of the slope a slot is cut across the chute wide enough to allow the slowly moving flat stones to drop through, while the rapidly moving round pebbles would have sufficient momentum to clear the opening. This method may work out satisfactorily and if so it would be cheaper than the shaking grill; but it would be difficult to gauge the momentum of the two kinds of stone and it is seldom possible to feed the gravel into a chute so regularly as to allow the separation to take place.

Gravel as it is dredged and separated from the sand is likely to be fed spasmodically, one time in a large volume and another space of time little if any be fed into the chutes. A grill without being shaken would prove little better if any than the slot cut across the chute.

Another method that can be used if these flat stones are shale, as is sometimes the case, and especially if the ground gravel or product must be washed after it is produced, is to grind up all the product and wash out of it the ground shale, which is easily done as the shale is like mud or bran, much lighter in weight than either the quartz or silica of which the gravels are composed.

In the Pittsburgh district of Pennsylvania, especially in the streams flowing north, the gravel frequently occurs in larger quantities than the sand, and mixed with the gravel there is at times a large percentage of flat blue stones. These flat blue stones are either Ligonier blue stone, a blue limestone or dolomite, and at times some lue shale. This blue shale as a rule is quickly decomposed by the stream and turns to mud.

If there is only limestone and bluestone there can be no objection to these except for the discoloration, for if the sand produced is to be used for foundation concrete, or heavy construction or for paving, there can be nothing against the blue stone, for it is a fine grained sand stone, while the ground limestone would make better concrete. Only for monumental work would the slightly blue discoloration prove objectionable.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each.

1,419,980. Rockcutting machine. Frederic J. Palma, Denver, Colo., assignor to Universal Coal Machine Co., Phoenix, Ariz.

1,420,021. Crusher and pulverizer. William M. Davidson, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place.

1,420,031. Crusher and pulverizer. Alexander Gillespie, Pittsfield, Ill., assignor to Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.

1,420,054. Crusher and pulverizer. Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place.

1,420,355. Bar gage for grinders. Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place .

1,420,733. Excavating apparatus and drag bucket. John C. Mundy, Philadelphia, and Harry T. Wilson, Tullytown, Pa.

1,421,345. Dredge-bucket. George R. Hanks, High Bridge, N. J., assignor to Taylor-Wharton Iron & Steel Co., same place.

Indiana On 100% Time

"Chip" Stone a Great Success in Many Sections

By Our Indianapolis Correspondent

Indiana crushed stone plants, which are running 100 per cent time, have enjoyed an unparalleled prosperity this year. The plants have not been particularly affected by car shortages and the vast amount of stone road construction has made business particularly good. There are a score or more crushed stone plants operating in the state and the tonnage output of these plants now is larger than for any other time this year, according to F. H. Connell, secretary of the Indiana Crushed Stone Association. In addition to the heavy tonnage used for road building, the companies are supplying crushed limestone as a fertilizer.

Quarries now are turning out a "chip" stone that is said to be particularly effective in road building, especially on roads where the county or township has no road machinery. This chip stone is spread over the surface, raked smooth and rolled and soon packs into an ideal roadway for general purpose hauling. The chip stone is also growing in favor as a surfacing for private driveway and for by-roads in the state. The Standard Oil Company is putting down a bituminous penetration surfacing at all their filling stations in Indianapolis. Chip stone is used as the surfacing material into which is forced bitumen. Marion county commissioners likely will make a change in the building of hard surface roads, cutting the width of the concrete two feet on each side and putting down a chip stone shoulder, including the extra two feet that is usually allowed for a gravel shoulder. By this process the road is made eight feet wider at no extra cost. It is said this plan really makes a better road than extending the concrete, inasmuch as the gravel shoulder cuts down and makes a jump from the concrete to the surface of the shoulder.

Notice has been given by the board of county commissioners at Indianapolis that bids will be received soon for gravel producing equipment. The company will purchase one gasoline hoist, 2 drag line gravel excavating outfits that will handle on an average haul of 100 feet 23 to 30 cubic yards per hour, hauling gravel to the screening plant from pile to bank, and also a road maintainer that will cut a swath approximately 12 feet.

Just at the present time the trade in Indianapolis is becoming very much interested in the proposed formation of what will be known as the Indianapolis Industrial Foundation, with a capitalization of more than $1,000,000, which will be used to provide financial and advisory service to both old and new industries in the city. Some of the most prominent men in the trade here are backing the movement, which promises to be of vast assistance to the industrial health of the city. While not so important to the retail end of the trade, the fact remains that in order to further the cause, the retailers are coming forward almost in a body with their moral and financial support toward the formation of the organization. The Foundation will be sponsored by the Indianapolis Chamber of Commerce and will function through the Bureau of Industries of that body. It is the intention of those behind the movement to create such a large reserve fund in the capital stock issue that industries may be aided financially at a nominal rate of interest, when an investigation of the organization, its product and its market area show that by the aid of capital and some good sound advice, the industry can keep its head above water. In this way the older industries of the city will be benefitted as well as the new. One prominent man in the trade here said when talking of the wholehearted support the trade was giving the movement, that it was the intention to keep failures in Indianapolis down to a minimum. He said many failures were due to lack of financial assistance at the right time and also lack of proper cooperation on the part of other executives who might have the solution of that particular problem if they were appraised of the situation. It is planned to make the foundation self-sustaining through the rate of interest charged.

Hearings of statements of the Kokomo Stone Company, Kokomo, Ind., in regard to charges of the Indiana board of accounts that the company has defrauded Grant County of more than $18,000 on shipments of stone, was not held the latter part of July, but representatives of the company attended a brief conference with the board in the office of Governor McCray. Following the conference, Jesse E. Eschbach, chief examiner of the board, said that the law made no provision for the holding of a hearing such as was requested by the company. He said the law provides for the chief examiner to certify the charges to the Governor and for the Governor to send them to the Attorney General for action. He said the provisions of the law would be carried out at once and any discussions of the case would be held with the company by the chief examiner and the Attorney General. It is expected that in the event the company refuses to settle the amount of the charges on request of the Attorney General that the case will be carried to the courts.

L. V. Kirkpatrick, attorney for the stone company, said that no statements were made in the conference in regard to the case except a general denial that the company shortweighted Grant County on stone shipments as charged by field examiners. He authorized the statement that the company denies all of the charges contained in the report. He said the company had been giving the county excess weight instead of short weight. He said, in discussing the case informally, that the decisions of the Appellate and Hendricks circuit courts, which attacked the powers of the accounts board, are regarded as having special bearing on the stone case. In these decisions the courts held that the duties of the board are to conduct accounting rather than to make investigations of the expenditures of public money. The state, however, is preparing to contest the decisions before the Supreme court.

Fearing a repetition of the situation of 1920 when they were unable to obtain open top cars for the shipment of their product on account of preferential rulings favoring coal shippers, the Indiana Sand and Gravel Producers Association, at a recent meeting in Indianapolis, empowered E. Guy Sutton, Danville, Ill., former secretary of the National Association and chairman of the local car supply committee, to act with his committee in an attempt to assure a fair distribution of cars to the sand and gravel shippers.

New Reference Book on Freight Rates and Claims

"Freight Rates and Charges," a recent publication of the Traffic Service Corporation of Chicago, Illinois, is a very comprehensive work on the construction, operation and development of railroad freight rates and charges in their application to interstate and foreign commerce. The purpose of the work appears to be to state the present law governing the proposition involving freight rates and charges in a manner that is readily understandable in its application to everyday problems. It covers all the questions involving the legal status of different kinds of rates, the establishment of rates, charges, quotation and assessment of rates pertaining to transportation, adjustment and reasonableness of rates, advancement, reductions and comparisons, investigation and suspension of new rates.

Undoubtedly daily access to this book will prove of material assistance in locating authorities on the proper adjustment of rate, claim and reparation matters. It should be of considerable value to operators in the pit and quarry fields, whose chief worry in these days is the matter of railroad rates. There are in the book 1,500 authority citations, a complete index and a complete table of cases. The 1922 edition, just off the press, is up-to-date on all recent changes of any importance. The volume is sent on five days approval. The price, bound in law buckram, is $7.50. For copies address Traffic Law Service Corporation, S. W. Corner Adams and La Salle Sts., Chicago, Ill.

The Triangle Rock and Gravel Company, San Bernardino, Cal., was formed recently.

Gravel Meet Postponed

Constitutional Convention Date Now Given as December

By Our Washington Correspondent

Because of the existence of priority orders and of the railroad situation generally, the constitutional convention of the National Association of Sand and Gravel Producers will not be held at Chicago in September as planned, it was stated at the headquarters of the association in this city. It is possible that the convention will be held in December, but this date is not definite.

The applications which the association has filed with the Western Trunk Line Committee at Chicago and the Southwestern Freight Bureau of St. Louis requesting a reduction in minimum car load weights on sand and gravel to a basis of 90 per cent of the marked capacity of the car, instead of the full basis of marked capacity as heretofore, have not yet been granted. Officials of the association have made no effort to obtain this ruling from the two organizations named because of the condition existing regarding the railroads. Such an application has already been granted by the Trunk Line Association and steps will be taken by officers of the National Association to obtain a similar ruling from the other two organizations as soon as railroad conditions are stabilized.

Federal aid probably has been the most important factor in the big boom in highway building of recent years, and there are now many long stretches of trunk-line highway serving rich agricultural and industrial sections of the country which are almost entirely Federal-aid construction. The Bureau of Public Roads, which administers the Federal-aid fund, points out that a traveler going from Richmond, Ind., to St. Louis across Indiana and the southern part of Illinois, thence to Chicago by way of Springfield and Peoria, a distance of approximately 679 miles, would travel 505 miles, or 75 per cent of the way, on Federal-aid highways, practically all of which should be in service by the end of the present season. But this is only a small part of the great highway system which the government is aiding to build. The system is being designed to serve the whole country and will be approximately 180,000 miles in length.

And Federal aid has done a great deal more for the country than simply to provide funds for road construction. One of the most far-reaching results has been its influence in placing the greater part of the highway work of the country in the hands of experienced engineers of State highway departments. In 1915, prior to the Federal-aid act, 70 per cent of the road work was done by agencies other than State highway departments, most of it by county officials. Such a system was bound to be wasteful. Overhead costs were high, engineers were not always employed, systems to serve the best interests of the State as a whole were not developed, and the opportunities for corruption were greater.

With the passage of the Federal-aid act of 1916 and the insistence of the Government upon the construction of Federal-aid roads under the supervision of State departments, existing State highway departments were enlarged and strengthened, and in 17 States adequate departments have been created where there had been none or where the existing one was not properly equipped to perform necessary functions. With adequate departments the work has been shifted to their control until at the present time they supervise more than 60 per cent of the road work. This assures to the taxpayer the services of engineers trained in road work, a centralized authority responsible for the expenditure of funds, and a far-sighted plan of development and financing.

But the Government has gone even further. In addition to appropriating millions of dollars for road building aid, surplus war material valued at $139,773,986 was delivered to the States for use in road construction up to July 1. The material, which consisted of all sorts of supplies and equipment suitable for road building for which the War Department had no further need, was distributed on the same basis as monetary Federal aid. In value of material delivered, Texas and New York lead with nearly $8,000,000 worth of material, and every State with the exception of five of the smaller ones received supplies valued at over $1,000,000. This material has been of great value in road

construction, and there is hardly a county in the United States in which some of it has not been used.

The system of distribution has been so arranged that the States requisition only material useful to them. In some cases they fall behind in allotments in order to wait for material particularly desired. Many of the States have shown great ingenuity in conditioning worn equipment, using war material to equip shops in which other war material is made suitable for use. There is still a large quantity of material in this country for distribution. This will be further increased by material used by the army of occupation in Germany soon to be brought back. In the shipment of surplus war materials, state highway departments will be saved a great deal of expense as a result of a ruling of the Interstate Commerce Commission permitting the shipment of this material as "contractors equipment," thereby giving the advantages of a low rate.

The railroads previously required the states to pay less-than-carload rates on the various items included in such shipments, even when together they made up a carload. The contention is that since the bulk of this material has been used and none of it is new, and since it is all intended for use in road construction, it should be given the advantage of the low rate allowed to contractors equipment. This contention, which was opposed by the railroads, was upheld by the Interstate Commerce Commission. The rate is now applicable to some 1,200 carloads to be shipped from Camp Grant, Ill., and large quantities from other points. On a carload shipment from Schenectady, N. Y., to Boise, Idaho, $720 recently was saved, and $500 on another from San Antonio, Tex., to Salem, Oregon.

The fame of American road building has reached foreign countries and many, particularly those of South America and Japan and China, are much interested in American methods of construction. In recent months the Bureau of Public roads has been visited by several Japanese and Chinese engineers sent to this country to study the operation of the Federal and state highway organizations and to inspect actual construction. According to some of the Japanese visitors, their country has recently made its first appropriation for modern highway construction, an amount that would not be considered large by some of the states in this country, but it is thought that the amount will grow rapidly when the people can see the benefits of the roads to be constructed with the present appropriation. In response to the interest in American roads shown by the South American republics the Pan American Union recently issued an educational bulletin on American roads, printed in Spanish and Portuguese, describing American practice, and illustrated by photographs collected by the bureau showing types of roads, road construction, and construction machinery. The bulletin will not only be invaluable to the South Americans in solving their road problems, but should stimulate trade in American road machinery.

Two Suggestions

The Portland Cement Association has sponsored and carried out a good piece of work in standardizing the specifications of portland cement. It, however, has not standardized portland cement. Some grades are very much better than others. All of them pass the requirements of the standard specifications, but some of them just barely pass it, and others pass it by a very wide margin. It is therefore inevitable that within a short time there will be a grading of cement. The cement industry does not welcome this, as it will complicate sales and manufacturing, but there is a strong demand for it by many prominent civil engineers. Some of the more progressive cement manufacturers favor it.

Again, there is another phase of the question which is closely associated with the grading of cement. We have reference to the bettering of portland cement as a product. Very little work is being done on that at the present time. The Portland Cement Association is confining itself to the education of the public in the use of its present product and claims that there is no use in manufacturing a better grade of cement until the public knows how to use the present grade. There is something in this, of course, but no industry can be regarded as healthy which disregards completely the work of improving its product. What is the portland cement industry going to do about it?—*Engineering News-Record.*

Wisconsin Writes I.C.C.

Mineral Aggregate Association in Appeal for Share of Cars

On August 14th the letter below was written to Honorable Edgar E. Clark, Chairman of the Interstate Commerce Commission, by the Wisconsin Mineral Aggregate Association. A similar letter was written to each member of the Interstate Commerce Commission, to Senator Lenroot, to each representative of Wisconsin, and also to the chairman of the Wisconsin Railroad Commission.

Hon. Edgar E. Clark, Chairman,
Interstate Commerce Commission,
Washington, D. C.
Dear Sir:

Under date of July 25, 1922, the Interstate Commerce Commission issued Service Order No. 23, declaring that an emergency existed, and instructed the railroads to discontinue the use of cars suitable for the loading and transportation of coal for the transportation of commodities other than coal so long as any coal mines remained to be served with such cars.

The effect of this order is nation-wide. There is not a shipper, either large or small, who will not feel this service order. Shipments will be curtailed, necessitating a decrease in production, thereby causing a reduction of operating force. Large users of open-top cars, such as shippers of sand, gravel and crushed stone, as represented in Wisconsin by the members of the Wisconsin Mineral Aggregate Association, will have to close their pits and quarries, causing the complete shut-down of federal aid, state and county highway programs and the building industry.

The Wisconsin Mineral Aggregate Association is an association composed of producers of sand, gravel and crushed stone, and its purpose is to promote and extend the uses of mineral aggregate by devising ways and means of conveying to the public the merits of the product; to create and extend cordial and friendly relations among the producers and users of mineral aggregate; to discourage unfair and unscrupulous business methods; to promote higher and better business ethics.

The members of this Association require at least a minimum of 500 open-top cars per day, to successfully conduct their business, 85% of this number of cars being used in the construction of important federal aid, state and county highways.

The Wisconsin Mineral Aggregate Association recognizes the need for the equitable and proper distribution of coal to offset the hardships of the coming winter and the members would, if necessary, gladly close their plants indefinitely if by doing so they could remedy or alleviate the possible suffering of the people, due to a shortage of coal for the homes or a general shut-down of essential manufactures; but, these coal shortages or crises are not new.

In 1920, we passed through a similar emergency. Embargoes were placed and priorities affected nearly every shipment. Service orders affecting, as they do, the entire shipping nation, should eliminate the repetition of past abuses of former service orders. It was brought out in 1920 that cars were denied to sand, gravel and crushed stone producers when mine tracks were congested with empty open-top cars due to the inability of the mines to load sufficient coal. The cars laid idle for many days and in the interim could have been usefully employed for the carrying of other commodities.

The car shortage for other commodities could be modified by using the open-top cars for loadings in the direction of the mines, and in this way, congestion at the mines would be partly avoided.

The sand, gravel and crushed stone industry was denied cars in 1920, while investigation showed that there were numerous idle cars at the railroad terminals and sidetracks.

The importance of the highway program can only be lightly touched upon, but at the present time there are 450 miles of federal aid, state and county highways under construction in Wisconsin. These are main arteries of travel serving over three millions of people, providing all year travel for over 400,000 auto trucks and pleasure cars, providing facilities for the transportation of food products from the farming communities to the cities.

Such an important industry as the sand, gravel and crushed stone producers, serving, as they do, the whole State, should be put in a higher priority class than the unessential indus-

tries such as toy manufacturing, piano manufacturing and like concerns who would come under class five.

Another point to be taken in consideration is that the sand, gravel and crushed stone producers rarely ship later than November 1, and this date is generally prior to the cold weather.

Under class five of service order No. 23, there are no restrictions as to the reconsignment of coal, as this class represents a large portion of the coal consumers. Numerous open-top cars could be tied up indefinitely by diversion and reconsignment and it is impossible to say just what would happen as to price speculation due to lack of restriction applicable to this class. It is a fact that in 1920 speculative coal companies were very prominent in the coal industry.

During 1920, all open-top cars were removed from Wisconsin and sent to the coal-mining states. Due to congestion and over-supply of cars to the mines, these cars, regardless of the embargo which prohibited industries in Wisconsin from using them, were actually being used by similar industries of the coal-producing states.

From experience with the similar order of 1920, it is evident that if the proper distribution of cars had been made, that the sand, gravel and crushed stone industry could have been served and sufficient cars given to the mines to relieve the coal shortage, and we pray you that this service order No. 23 be so modified that this industry will be permitted to have open-top cars after the four classes enumerated have been supplied.

Yours very truly,
WISCONSIN MINERAL AGGREGATE ASSN.
Executive Secy.

The Iron Ore Gravel Company of Orange, Texas, has been organized and charter filed with the secretary of state at Austin. The company is capitalized at $10,000 and the incorporators are: B. N. Akin, Len Fruter, and Lee Woolworth. The company will do a general sales business in gravel from the iron ore fields of East Texas, this gravel having been found especially good for road building.

Texas Business Slower

Gravel Men Fight State Law On Heavy Trucks

By Our Dallas Correspondent

The railroad strike is materially affecting the sand and gravel business in Texas, and business has slowed up considerably as a result. Contractors, road builders and other users of sand and gravel in large quantities are complaining bitterly at their inability to secure material for carrying forward their work. Numerous large contracts and building projects are being delayed for lack of sand and gravel.

Dallas County is perhaps feeling the effect of the railway strike more keenly than others in this section, as this county was in the midst of a gigantic road-building program when the strike of shopmen was called. The work was going forward on the projects called for under the expenditure of the $6,500,000 in real bonds voted some time ago. What is known as the "Belt Line," a graveled highway encircling the City of Dallas just inside the county line connects all the cardinal highways radiating from the city as the spokes of a wheel from the hub. Most of the cardinal highways are of concrete or asphalt construction, and the belt line is to be of gravel. The construction of the belt line calls for enormous quantities of gravel, and for much of the road the gravel is to be hauled by train to points near the construction work and then hauled to the road in trucks or wagons. The contractors have been unable to get delivery of the gravel by rail to these points and the work on this highway is being materially retarded.

Gravel dealers are also complaining against inability of the railway companies to make deliveries of their products. Large orders from many parts of the state have been received, but can not be filled because the railway companies have been unable to move even perishable goods and have refused absolutely to haul sand, gravel and other road-building materials as long as merchandise, fuel or other necessities have been awaiting transportation.

Texas gravel dealers are still fighting the Texas truck law, which limits

the weight of loads hauled over Texas highways. Drivers of overloaded trucks are being arrested by officers patroling the Texas highways, but enforcement of the law is being held up pending a decision of the higher courts as to the constitutionality of the law. The act has been held to be unconstitutional on the ground that it is class legislation, and this point has gone to the highest court for decision. Gravel men claim enforcement of the law will practically ruin their business, as they will be compelled to use small trucks, which will materially increase the cost of making delivery and that this additional cost must be added to the price to be charged for sand and gravel. Many dealers have entered contracts for delivery of large quantities of sand and gravel at prices based on delivery by means of large motor trucks, and the enforcement of the state law will cause them to forfeit these contracts or lose heavily in delivering the sand and gravel called for.

Weather has been favorable for delivery of sand and gravel by motor truck during the summer as there has been but little rain, and dealers supplying nearby works have experienced no slackening of business. Comparatively few of the larger dealers near Dallas are depending entirely on motor trucks for delivery, however, and the industry as a whole has keenly felt the effect of the railroad strike.

The City of Dallas has several large paving jobs in contemplation, but work is being delayed because of inability to get delivery on orders for crushed stone and other paving materials. With these and other projects in this vicinity now being held up, a substantial improvement in the sand and gravel industry is expected as soon as the railway strike is settled.

Prices for sand, gravel and crushed stone have not dropped on account of the rail strike, but have held steady with an upward trend as the demand for materials has grown in the face of inability of dealers to make deliveries. Sand is being delivered by truck on the job in Dallas, where it is to be had, at $4.00 to $5.00 per cubic yard. This is about the only way sand is selling here now, as deliveries by train seem out of the question. Gravel, pit run, is being sold at $1.50 to $2.00 per cubic yard, loaded on trucks at the pit, where purchasers supply trucks and wagons for hauling. But little gravel is being loaded on cars. Gravel delivered on the job in Dallas commands much higher price, and ranges from $3.50 to $4.50 per cubic yard. There is considerable variation in price due to conditions of haulage and of delivery. Crushed stone in Dallas is obtained from sources 50 to 150 miles distant, and uncertainty of delivery makes quotations on this material only nominal.

Gravel, sand and crushed stone dealers generally are optimistic in the face of conditions, and look forward to an early settlement of the rail strike. They are confident that their business will show rapid recovery and be greatly improved when transportation becomes more nearly normal.

Fire totally destroyed the Salem stone mill at Bedford, Ind., the night of July 30 when the plant was struck by a bolt of lightning during an electrical storm. The loss to the stone company is estimated at $400,000. The walls of the mill shed 810 feet in length are a mass of ruins and in the debris is a car load of molten window panes. Twelve of the steel gangs were twisted and torn and the six new immense steel gangs, which were just installed at a cost of more than $20,000 and which had been in use three days only, stand alone and are badly damaged from above the shed. The $75,000 power plant is a total loss. The Salem mill has been the butt of the elements. Built in 1910, it was razed in 1911 by a tornado, which swept the district. It was rebuilt immediately. Officials of the company announce the plant will again be rebuilt. Nelson Joiner, general superintendent of the Indiana Quarries Company, estimated the loss. He brought joy to the downhearted employes when he informed them they were to report to the Hoosier mill at Oolitic, Ind., owned by the same company, where they will be taken care of and given employment. The Hoosier mill will be worked day and night in order to fill contracts the company had on hand.

Orders, But Few Cars

Handicaps Are Holding Up Good Business In Louisville

By Our Louisville Correspondent

A perfectly good business has been held up and handicapped by embargoes and car shortage so far as the sand and gravel and crushed stone people of Kentucky are concerned. There has never been a time of better business prospects or more active trade demand than during the dog days this year. Right when everything should be going good there is transportation trouble complicated by embargoes which hamper the movement of crushed stone by rail and also the shipping of sand and gravel from Louisville yards to consumers out in the state. The one bright spot in the whole situation is an active building and good business locally. There is also some prospective clearing of transportation clouds and a big volume of fall business in carload quantity in sand and gravel.

Building operations in Louisville have been going on through the summer season at the rate of a million dollars worth a month. June and July both furnished practically a million each in building permits, and an estimate by the building inspector's office at this writing indicates that August will pile up a million too, all of which is at a rate of about twice the record in prewar days.

Meantime out in the state there is not only active road building but there is prosperity among the farmers which speaks well for an active fall trade with retail dealers in building material, which means a good volume of carlot business. The tobacco crop report indicates a total for the state of 520,279,000 pounds as compared with 325,710,000 last year, and a healthy increase shows too in the wheat and corn crops, which means prosperity and more business among the farmers. The only trouble is cars, and here's what the big guns in the local sand and gravel trade say about that.

The Ohio River Sand Co. say that they have plenty of orders offered them for carlot business, but between the scarcity of cars and the embargoes it is practically impossible to care for these orders and to make shipments. The one bright spot in the situation is a very good volume of local business.

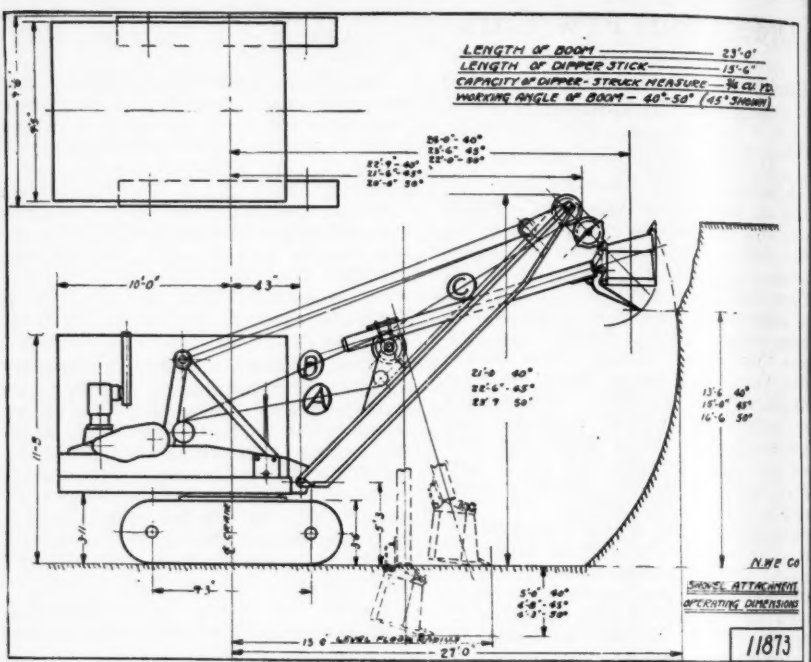
The E. T. Slider Co. say they are swamped with orders and handicapped for want of cars. They can get cars to load for the coal mining districts, but the trouble is there is not much demand from those sections. The big demand right now is from the bluegrass section and cars are not to be had in any satisfactory numbers for this territory. The local trade is splendid and there would be lively doings in the carlot trade if the cars could be had.

There is some tendency noticeable to relax the embargoes, and there is some prospect of settling the strike troubles and improving transportation soon. If there is transportation relief during the latter part of August then the last week or two in August and September should prove to be record months in the shipment of sand and gravel from Louisville to state points.

Joseph M. Boggs, state highway engineer entered a protest on embargoes which interfere with the movement of road material, and efforts are being made to keep the road work going on uninterrupted. Those who have local quarries in connection with road contracts of course are in good shape so far as crushed stone is concerned. Those quarries which have to do rail shipping though, whether it is for road contracts or other purposes, are hampered by slow transportation and embargoes. Road work though hampered some is not as seriously hampered as the general commercial movement of crushed stone and sand and gravel, and the indications are that the road work will not be very seriously hampered for any great length of time.

In addition to building operation locally the city is doing considerable work. For example a contract was let recently to the Henry Bickel Co., for a sewer job in Cherokee Park which amount to $111,092,87.

The McArthur Concrete Pile and Foundation Company of New York, operating in Texas under a permit from the Secretary of State, has filed an amendment to its charter provisions increasing the capital stock from $250,000 to $375,000.



New Gas Shovel—Fig. 1

New Gas Shovel

The Northwest Engineering Company of Green Bay, Wis., announces that after exhaustive tests in the field a new Northwest gas shovel has been released for general sale. This shovel, because of its sturdy simplicity and unusual range of utility, is expected to find wide application for the general contractor and road builder, and in quarries and sand and gravel pits.

The device is an adaptation of a new, and according to the manufacturer a revolutionary shovel mechanism, to the Northwest crawler crane. This crawler device is depended upon to give the shovel ideal mobility. Incorporated in the crawler base is the patented Northwest steering device which, in the words of the maker, make the device "as easy to steer as a truck." The shovel travels at a good rate of speed to and from the job without taxing the motor and, being operated by a gas engine, no stops to get up steam are necessary.

The outstanding features of the shovel are stated as unequalled simplicity, combined with particularly powerful crowd. This is accomplished without the usual gear mechanism or rack and pinions and without separate crowding engines or auxiliary driving apparatus of any kind. This ingenious arrangement of cables and sheaves, which eliminates gears and auxiliary drive for crowding or pulling up the dipper stick, is illustrated in Fig. 1. Line A is operated from the left hand drum and is the hoisting line. It passes through the padlock sheave on the dipper and is dead-ended on the large side of a compound drum near the head of the boom. Line E is operated from the right hand drum, passes through a sheave on the dipper shaft, and is dead-ended near the dipper. A third line (C) is dead-ended on the small side of the compound drum at the head of the boom, passes once around an independent sheave on the dipper shaft, and is dead-ended near the upper end of the dipper stick. A novel feature is found in the fact that line C is not operated by any hoisting drum, but careful study of the action of the lines when the shovel is in operation will reveal how any combination of hoisting, lowering and thrusting in or out

is accomplished with this simple rigging.

Suppose that, with the brake set on drum controlling line B. line A is pulled in. The dipper moves in the arc of a circle of which the dipper shaft is the center. If now it is desired to crowd farther into the bank or to move the dipper farther out to load a wagon, etc., all that is necessary is to release the brake slightly on line B. The action then is that line A, pulling on the large side of the compound drum, puts a greater pull on line C which as explained before is dead-ended on the small side of the compound drum. This pull on line C then forces the dipper stick outward. Conversely, if it is desired to thrust inwardly, releasing the brake on line A and hoisting line B produces this effect.

The range of the Northwest gas shovel is shown in Fig. 1. It will grade to a 30 foot flat width, 4 feet below grade and handles a ¾-yard dipper without taxing the engine which develops 50 h.p. at 800 r.p.m., thereby providing an ample margin of reserve power. The shovel has all railroad clearances for shipment anywhere, without dismantling. It has the travel ability and power to load itself on a flat car and is ready for instant operation upon arrival at its destination.

Where electric current is available, the Northwest may be used with an electric motor instead of a gas engine. The new crowding device may be expected to broaden the field of the small electric revolving shovel. Small revolving shovels are being used in increasing numbers in construction work and in quarries and gravel pits, in some cases to supplement large railroad shovels and in other cases taking their places. Many of these plants are electrically operated, and in some of these cases electric power on the shovel presents advantages over any other power.

The new crowding device presents a solution of the problem as related to electric power which is believed to be superior to the usual electric shovel because only one motor is required, hence lower first cost and simpler and cheaper maintenance. The new crowding device is fully as efficient as steam, while it is a recognized fact that the usual electric motor crowd is not.

The shovel attachment can be applied to the Northwest crane or dragline by simply laying down the crane boom and mounting the shovel boom.

The Ashburn Works of E. I. du Pont de Nemours & Company, near Hannibal, Mo., will resume the manufacture of high explosives early in September. This plant was closed down about a year ago when business conditions caused a falling off in the consumption of dynamite. During the time of the shut-down, the trade logical to the plant was supplied from other operating works. The improvement in business conditions, resulting in increased demands for high explosives, makes it necessary to resume operations. The Ashburn plant has a capacity of about 15,000,000 pounds of high explosives per year.

A new building material firm, to be known as the Buck Hill Washed Sand Company has been formed, with C. S. Rodgers of Bucyrus, Ohio, president, and Wm. Timp, secretary and treasurer. This concern is building an up to date washing plant at Buck Hill, and machinery and equipment costing approximately $50,000 has been purchased.

New Gas Shovel—Fig. 2

View in Shops of Greenville Gravel Co., Greenville, Ohio

Service for Producers

There are few producers so fortunately situated as to be able to have their own shops and mechanical staff for the manufacture of the equipment required in their plants.

One such is the Greenville Gravel Company, Greenville, Ohio, which now operates a dozen plants in several states and ships over 6,000,000 tons of sand and gravel annually.

Its maintenance and manufacturing department, the Greenville Manufacturing Company, located at Greenville, has now been in operation several years and has proven its worth as an economic factor in the organization. Here is made practically all of the equipment used in the various plants, and in the engineering department new plants and extensions are also designed in every detail.

This service is now being placed at the disposal of other producers as well, and to this end a catalogue of equipment which the company makes has been compiled and will be sent to any producer on request.

These shops are also prepared to repair and rebuild the heavier pieces of equipment, such as steam shovels, locomotives, cranes, crushers, etc.

The designing staff is also at the service of other producers, either to design complete new plants, or to extend and rehabilitate old ones. Mr. Frank M. Welch, has been in this specialized line practically all his life and is well equipped for this work.

Truck and Wagon Loaders

The George Haiss Manufacturing Company, Inc., 141st Street and Rider Avenue, New York City, has recently issued a new catalogue on truck and wagon loaders, many of which are used in the pit and quarry industries.

This catalogue shows a number of installations in this field; and in addition to giving specifications and manufacturing details, the catalogue is of considerable interest as it gives comparative figures on loading with the Haiss loader and by hand.

The company will be glad to send a copy of the catalogue on request.

The Ferguson Gravel Company has been organized in Indianapolis for the purpose of developing gravel deposits in Marion county and other parts of the state. The company has a capital stock of $25,000 and the organizer are Samuel F. Ferguson, William J. Norton and Wade Donnelly.

Motor Truck Mounting for Byers Crane

A big forward step in "taking the crane to the job" has been made by The Byers Machine Company of Ravenna, Ohio, in bringing out a crane that can be mounted permanently on a motor truck.

The new outfit, called the "Byers Truckrane," can be driven from the garage to the job every morning just like any automobile, or driven from one job to another with a minmum of time lost in travel. In addition, its increased "movability" together with the strength and comparative lightness of the unit, open a new field of crane service. Owners whose work has hitherto been too limited to operate a large crane, can, it is believed, use a machine of the "Truckrane" type at a profit. It should prove an ideal piece of equipment for general contractors, material and supply dealers, counties, municipalities, and industrial plants.

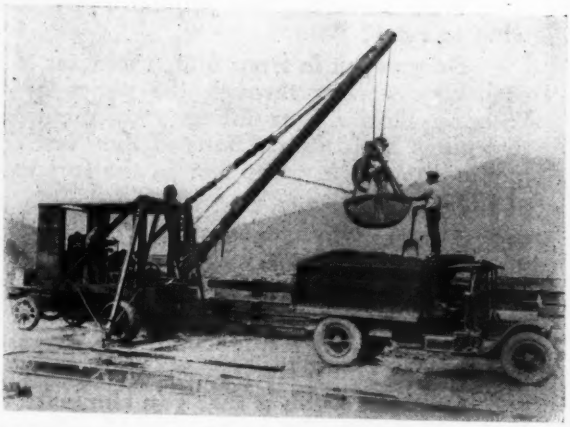
The crane, unmounted, weighs only six tons, and is similar to the Byers Auto-Crane Model "1" in every respect except that it has no wheels, jack shaft, nor differential and drive chains. It has a power drum for raising and lowering the boom which is of steel.

The crane is furnished with a Hercules four cylinder 4"x5" engine developing over 30 H. P., to be operated with gasoline power. Any half cubic yard bucket weighing not over 2,000 lbs. can be used with it.

It is not at all necessary to use a new truck for the mounting. One that has seen 90% of its usefulness, having a motor that is capable of turning over, is all that is needed. Bargains in half-worn out motor trucks can be had everywhere, making the first cost of a complete outfit extremely reasonable.

The "Truckrane" shown above is owned and operated by The Worth Motor Service Company of Chicago.

The Byers Company has already started the erection of additional building and machinery required to manufacture the "Truckrane" on a large production basis without any interference with their standard lines of "Auto-cranes," Revolving Cranes, and Hoists.



Bin Gates

Even the experienced operator will be sure to learn something new about bin gates from a booklet on this subject published by the Beaumont Manufacturing Company, Philadelphia.

The booklet is illustrated from photographs and drawings showing the operation of the various gates made by this company for a wide variety of purposes.

The catalogue will be sure to give operators a number of suggestions for the improvement of this part of their equipment.

W. H. Kent, vice president and general manager of the Weller Manufacturing Co., left Chicago on June 28th for an extended trip throughout the European countries. Investigation will be made as to the possibilities of future trade, also inspection of Weller equipment installed in a number of the large plants. At the present time there are a number of projects contemplated in which elevating, conveying and power of transmitting machinery will be an important factor.

Frank Farrington's Business Talks

No. 8—Can You Read?

It's a fine thing to know how to read, isn't it?

Perhaps you know how and perhaps you make use of that ability, reading more or less each day.

Well, admitting that you know how to read, do you know what to read?

Do you put in from fifteen minutes to an hour and a half each day wading through the pages of the latest issue of "Sloppy Stories," or filling your mental stomach with the sweepings from the columns of the "last editions" of evening papers that begin to appear in the forenoon?

Do you devote that most valuable possession of each day—Time—to seeing what the chronic contributors to the comic page have to offer?

You are perfectly right in saying that it is none of my business how you spend your time or what you read, but I am entirely within my rights in offering suggestions that you take or leave, as you prefer.

One suggestion is that you eliminate the kind of reading that puts nothing into your head of subsequent use.

Why cumber your brain with trash, literary junk?

You wouldn't load up your trunk or your suit case with scraps of tin and brass and with bits of colored glass and samples of red bricks, just because those things looked bright and shiny or showed a pleasing color to you as you glanced at them in the rubbish pile.

When it comes to actual, material baggage, you avoid surplus weight.

And then you turn around and pile into your brain a daily jag of mental junk.

A book on business, a paper or a magazine relating to business, or more especially, to your particular business, like a trade journal, ought to be your companion at the times when you have a few minutes or half an hour to spend in reading.

You can make yourself a better business man by reading about your business, by absorbing new ideas about the kind of work you do.

Your ability to read gives you a chance to advance steadily in your occupation and it rests with you, not with me, whether your reading boosts you toward the top or holds you back in your efforts to climb.

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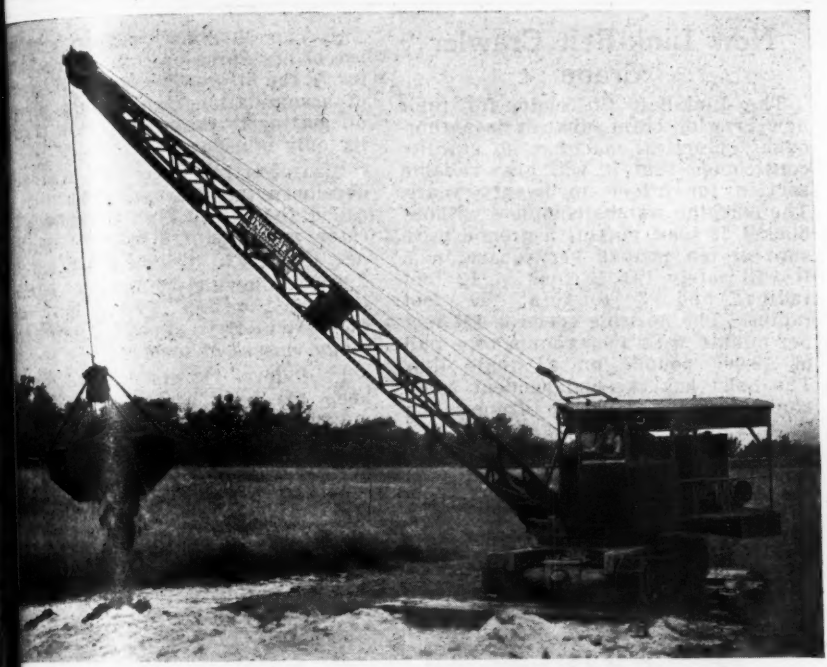


ANNOUNCING THE LINK-BELT CRAWLER CRANE

HERE at last is the new Link-Belt Crawler Crane—the machine which many have been waiting for—the machine which adds another successful link in the strong chain of Link-Belt quality machinery.

It is built to the high standard of quality characteristic of Link-Belt machinery. Its performance will astonish even those accustomed to seeing the best in mechanical achievement.

Rugged, responsive; strong, yet light; an ideal machine for road building, contract work or for odd jobs around the industrial plant.

Order now for prompt delivery—wire or write nearest Link-Belt office.

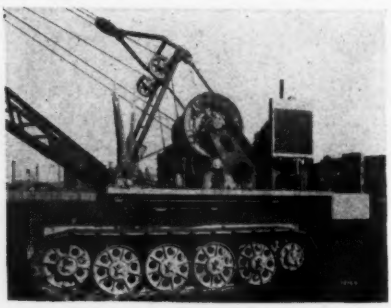
LINK-BELT COMPANY

Chicago—300 W. Pershing Road Philadelphia—Hunting Park Ave. & P. & R. Rwy.

LINK-BELT

New Link-Belt Crawler Crane

The Link-Belt Co. claim for their new crawler crane, that it is a thoroughly practical machine, so sturdily constructed that it will give reliable service for fifteen to twenty years. The machine weighs complete without bucket 22 tons, making a ground pressure of ten pounds per square inch. It will safely lift 10 tons at 12 foot radius, and 3 tons at 30 foot radius. The hoisting speed is 125 feet per minute with a maximum rope pull of 10,000 pounds on a single line. The hoist has two independent band-clutch-operated hoisting drums, and is suitable for dragline and clamshell bucket work. The crane will make



4 complete revolutions per minute, travel at ¾ mile per hour, and climb a 20 per cent grade. It is powered by a four cylinder, 5½x7 inch heavy duty tractor engine, running 800 revolutions and equipped with automatic governor, gear driven fan, centrifugal water pump, force feed lubrication to all parts, and Eiseman high tension magneto with impulse starter. This gasoline power plant is the product of the Climax Engineering Co.

Full information may be had by writing the Link-Belt Company, Advertising Department, 910 So. Michigan Ave., Chicago, Ill.

Positive Lubrication

As lubrication is one of the most important factors in the life of the machine, every operator should be able to know for a certainty that such lubrication is taking place. The lack of positive lubrication is the cause of a great many machinery repairs, loss of time and increased overhead expense. This can be done away with by the use of high pressure lubrication which forces the oil into bearings irrespective of accumulations which may prevent oil getting to the proper point if gravity only is depended upon.

A crusher lubricator which has been developed to relieve this condition is called the "Dot" high pressure lubricator, manufactured by the Carr Fastener Company, Boston, Mass.

The following points of superior merit in the "Dot" system have made it particularly adaptable for use on many classes of machinery:

1. Safety. It enables the oiler to keep his body and clothes clear of moving machinery.

2. It develops the powerful pressure of two to three thousand pounds to the square inch.

3. It handles the thinnest oil as well as the heaviest grease.

4. It may be operated with one hand.

Charter Gas Engines

The Charter Gas Engine Company, Sterling, Ill., has recently issued catalogue No. 22 on the Charter Type "C" oil engine. This catalogue is of particular interest because of the fact that it furnishes a practically complete education on this type of engine. It includes many diagrams, sectional drawings, half-tone illustrations, etc., for showing the engine in detail, and giving a very clear idea of its working. The catalogue also includes photographic representations of a large number of typical installations.

Arthur Whitcraft, manager manganese Steel Sales, Hadfield-Penfield Steel Company, in addition to his previous duties has also been placed in charge of all foundry operations at the Sowers Works at Bucyrus, Ohio. The rapidly expanding volume of orders for both "Era" manganese steel and special heat treated steel has made it necessary to very materially increase production and Mr. Whitcraft has already effected an appreciable relief from the congestion which has been interfering with the meeting of delivery promises.

The C. E. Negley Gravel Company of Indianapolis, has filed a preliminary certificate of dissolution.

End